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Subscriptions—In the United States, its possessions, and Mexico, $5.00 yearly; Canada, $5.50; elsewhere, $6.50 the year.

Advertising rates on application. All advertising copy subject to acceptance by publication committee.

Published monthly at Chicago, Illinois, by American Congress of Physical Therapy.

Entered as Second Class Matter June 2, 1930, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879.

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Suite 716 — 30 North Michigan Avenue, Chicago, Illinois

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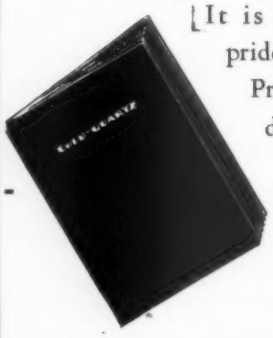

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THE LIMITATIONS OF PHYSICAL THERAPY IN OTOLARYNGOLOGY *

EDMUND PRINCE FOWLER, M.D., F.A.C.S.

NEW YORK

Appreciating deeply the compliment of being your guest of honor, it is but natural that I should hesitate to address you upon the subject of the limitations of physical therapy. It would seem more gracious were I to choose as my subject, "The Limitless Possibilities of Physical Therapy," and I assure you I could do far more justice to the latter title. My predicament, however, has engendered the thought that maybe the best service I can render would be "to speak right out in meeting," so that those who manufacture and sell and those who are, let us say, a little overenthusiastic in the use of physiotherapy apparatus in otolaryngology may perchance glimpse at least how many others are thinking.

According to the dictionary a thing is physical when it pertains to material things as opposed to mental, moral or spiritual things, and so physical therapy may be said to have the most solid foundation of any known therapy. This is also borne out by the fact that it is older than man himself.

Though physical therapy deals with material things, it is most essential that its advocates and practitioners should maintain a healthy mental, moral and spiritual attitude toward their therapeutic measures and the sick they are endeavoring to heal.

Unfortunately commercialism makes this difficult, and moreover threatens to surpass with extravagant romancing, not only the ballyhoo of all the physical cults of the past, but as well, the mental, moral and spiritual healing enthusiasts of today. The very fact that treatment deals with material things, with impressive machines, often with immediate and demonstrable and spectacular reactions, leads the ethical man to use great care lest he misinterpret, lest he overstate, or make unwarranted claims, and so lean towards charlatanry. With the best intentions it is often difficult to differentiate actual and material from psychological effects.

There should be no mystery made of physical therapy. Everyone uses it in some form consciously or sub-consciously and is apt to repeat or continue using it if it *appears* to have been of benefit. Its action may and should be explained in simple words. Some physical therapists have been too prone to use, and to continue to use, only the particular modality in which they were interested, and even beyond reasonable limits of toleration for the physical or financial welfare of their patients. Such criticism is avoided by a more honest and scientific attitude, and the high standing of those contributing to this meeting guarantees that such will eventually prevail.

Almost every physical therapeutic measure has something to recommend it in certain cases, whereas in others it may be impotent, unwarranted, or even definitely harmful. It behooves the physician to carefully discriminate as between these possibilities, and as to whether it may be used safely, or in simpler and less expensive form, and in part or in whole under guidance at home.

Diathermy; ionization; roentgen, ultraviolet, supra and ultra rays; and all the newer developments in physical therapy may be used in otolaryngology unless etiology, pathology and therapeutic requirements, etc., make them impotent or inadvisable. Those best qualified to describe their uses are addressing you at this Congress. In otologic practice I consider them as yet mostly of doubtful or negative value, except for certain surface lesions and the symptom of pain, which symptom being a valuable clinical guide should not be thoughtlessly masked. Any man who claims to cure *deafness,* as such, by any therapeutic measure is of course deliberately or ignorantly confusing a symptom with disease, because deafness may result from many widely differing lesions, requiring widely differing managements.

In deep sinus conditions, diathermic heat, in my hands, proved so disappointing that it was apparent it was not acting as advertised.

* Read at the Eleventh Annual Session of the American Congress of Physical Therapy, New York, September 7, 1932.

Experimentally, thermometers within the sphenoid sinus registered no appreciable effect from the strongest currents patients could stand through bilateral head electrodes. The reason for failure was simple. The dissipation of heat by conduction, convection and radiation prevented localized deep tissue temperature changes by diathermy. With rabbits only small elevations of temperature were occasioned by placing thermometers deep within the belly and chest cavities. It was not until the circulation was inadequate following strong currents, and especially just before death that a marked rise occurred. With the newer instruments and technique a rise of several degrees is obtainable, but the heat is diffused. It is *not* localized or concentrated at a focal *point* between the two electrodes as was formerly extensively claimed. It would have been well for all to have known this, and for all manufacturers to have so instructed their salesmen. There is quite enough virtue in diathermy to state the whole truth about it, and to recognize its limitations, as we recognize the limitations of all therapy and all apparatus.

If basic surgical principles are kept in mind coagulation by single and double electrodes is invaluable in rhinologic and laryngologic practices, particularly for hemorrhage when the bleeding points are accessible, and for the removal of small tissue masses, especially remnants of adenoid and pharyngeal tonsil tissue and lingual tonsils and varicosities.

In patients who might not tolerate a general anesthetic, tonsillectomy by surgical diathermy gives us a valuable alternative but should anyone tell a patient who needs tonsillectomy, "Do not use the old fashioned more dangerous method of surgical removal. Use the new bloodless method. The electrical, electrosurgical, non-cutting, no hospital, no anesthetic, no nausea, no pain method. In other words, surgical diathermy, or desiccation and fulguration; or coagulation or electrical removal."

Whereas such a tale seems well calculated to imbue even a timid patient with the feeling that he is indeed fortunate to be under the care and protection of one who controls such magic, it would be about as fair for a surgeon to say, "Do not use the generally non-approved method of electrically cutting the tonsil, because the pillars of the throat, and the great vessels of the neck may be injured by the electric irons. Bleeding from small vessels may be stopped by electrical methods, but the only certain hemostat is a ligature placed around the bleeding vessel. When a clamp and ligature are used there is no fear of post-operative bleeding. If you choose electrical removal you will have to submit to several operations as it is dangerous to extirpate the whole tonsil at one sitting. Also you may have a pretty sore throat, and especially a cough for some time. After all is said and done, it must be admitted that the delicate tissues of the throat will have been burned by the current. It is the resistance of the tissues which causes them to become hot enough to coagulate, to really boil — just as the resistance of the filament in the electric light bulb causes it to become hot enough to emit light."

Compare these two statements. Is there much more untruth stated or implied in the latter than in the former? I think not. Let us put a stop to such statements by a better education of the laity and of physicians. Let us be honest with ourselves, and make it a practice to use physical therapy whenever and wherever it is the method of choice, and only then.

One of the most encouraging signs of the times, (some say the only one) is the growing ability and desire to frankly recognize limitations. In the old days using milder measures less harm resulted from the use and abuse of physical therapy without competent medical and surgical supervision, but today, we are using amounts of radium, Roentgen ray, ultraviolet light, electrical current modalities, massage and vibratory effects and intestinal and nasal deluging which certainly would have startled and shocked our forefathers and may still more disturb our descendants. It may be that some of us are shocked more than we realize. Certainly God Almighty did a remarkable job when he made a human body sufficiently robust to withstand the continued use, and abuse, of many forms of present day physical therapy.

Because of some unwarranted claims and practices, to many, the name physical therapy has become an abomination. It has implied the use and even the exclusive use of apparatus, and methods of treatment without due consideration of diagnostic indications, and often without the guidance of a competent physician. It has implied sometimes that its

advocate is a mere technician, and unfortunately such has been not infrequently the case. This has been brought about largely because medical men have refused to sufficiently understand and prescribe physical therapy, thus unintentionally impelling their patients to seek relief maybe in some fad or healing sect, pathy, or cult, using physical measures.

As a remedy for the present chaos in physical therapy and the oftentimes humiliating position of its ethical advocates much has been accomplished by the Council of the American Medical Association and much will be accomplished by such meetings as this Congress, but still more will be gained if in every article about any and every method of treatment we stress the importance of *competent medical diagnosis,* therapeutic indication, and supervision, and especially that such cannot be obtained through a physician who does not know what may be accomplished by physical means. We must also point out the limitations of physical therapy, and stress the danger of its use in the hands of the ignorant. In the hands of any man who is not a qualified physician, especially one who employes any one therapeutic agent exclusively or even predominantly.

140 E. 54th St.

Discussion

Dr. Wallace Morrison, (New York, N. Y.): I am sure that this audience agrees with me when I state that our guest of honor need have had no qualms in reading his paper to us. We all must welcome a criticism that is at once friendly and constructive. Such criticism comes like a cooling breeze on the brows of some of us, who may perhaps be a little over-heated with our enthusiasm concerning methods of physical therapy which are rather new, only partly understood by many of us, and often quite spectacular in mode of application, if not in the results obtained.

That there are limitations in the use of many of the methods of physical therapy as we know it today, is obvious to any critical observer; they are more than apparent to anyone who is studiously applying physical therapy in his practical work. This is not to be wondered at, for there are limitations to almost every therapeutic method or system which is, or ever has been employed in the treatment of disease.

It is highly probable that certain of these limitations are inherent in the modalities themselves; it is equally likely that many of them are the result of misconceptions of the theory underlying the action of the particular modality being employed; it seems perfectly certain that the limitations of some of the types of physical therapy are directly and purely the result of the wrong kind of application of the therapy in question, in other words, of poor technic.

With the limitation inherent in any modality, we can do nothing at present, except to freely recognize its presence, and await the work of researchers who will perhaps perfect the present, or even find entirely new methods of physical therapy to replace those inherently limited in scope.

With the other two forms of limitation, we as individual doctors have much to do to correct, if not to entirely remove. Concerning wrong or misunderstood theory of action of any modality, it is obvious that this can be corrected by approaching the problem in the spirit of the student. All that is known or proven of these theories is available to everyone in the growing number of textbooks dealing with physical therapeutics, and in the accumulating mass of facts appearing in the medical journals devoted to this study. There can be no good excuse for unfavorable results in physical therapy due to misconceptions of the possible or probable actions of any modality due to ignorance of the work of others.

Again, speaking of the unfavorable results due to poor technic, the obvious remedy is a fuller acquaintance with the work of others struggling with the problem, by means of the literature, and actual instruction by those qualified to teach the correct technic. We surely may correctly assume that no one should attempt the treatment of disease by physical therapy who has made no real study of it, nor received the best possible instruction. May I urge that beginners in physical therapy pursue this method, rather than depend for theoretic and practical instruction upon the salesman of apparatus, whose business it is to sell machines, not medical instruction.

In the humble opinion of the discussor, the following are the present needs of the science and practice of physical therapy, if it is to overcome the limitations that now exist to a wider and more successful application of its principles:

1. The growth of the recognition among the medical profession that physical therapy is either a specialty in itself, or a branch of a particular kind of therapeutics lying within the scope of several of the medical and surgical specialties of the present.
2. The more general acceptance of the idea that the basic facts of physical therapy be taught to medical undergraduates, and that instruction in the application of physical methods used in any given medical or surgical specialty be included in postgraduate courses and special hospital interne teaching, much more widely than at present.
3. There is a growing need for the standardization of technic in the application of many of the modalities now at our command. This should be one of the aims of instruction everywhere, to first develop the best possible technic, and then to teach all to use the technic properly.
4. Finally, there is a crying need for the continued study of our modalities and the methods of their use, for study that is critical and broad-minded, freely admitting mistaken ideas or wrong methods and attempting to correct them, endeavoring to make the proper correlation between cause and effect in large series of carefully observed and scientifically controlled clinical applications of any given method, without either over-enthusiasm on

one hand, or stubborn and un-informed condemnation on the other.

Dr. Lewis J. Silvers (New York): I am fully in accord with everything that Dr. Fowler and Dr. Morrison have said.

It seems that we are in a field that is gradually approaching a scientific footing. We are slowly evolving a foundation which is going to hold the building that we are attempting to construct. It is unfortunate that charlatanry occasionally crops into our fold. This is less so today than formerly, because a sufficiently large amount of good scientific work is being done to overbalance this phase.

I showed the Academy of Medicine, two or three years ago, a dozen patients in whom the tonsils had been extirpated with perfect end results by electrocoagulation. I showed these cases primarily to prove from a scientific standpoint that there is something to electrosurgical tonsillectomy. Men from near and far have come in and observed my technique and have admitted that we can obtain a perfect tonsillectomy when the method is correctly employed. They have said that they found the fossa just as clear and clean after a year following complete electrosurgical tonsillectomy as they had hoped to find following the orthodox tonsillectomy, which I also do and would much rather do than the electrosurgical job.

The unfortunate part, I feel, in this chaos, as you have spoken of it, Dr. Fowler, is that we are as yet unable to teach properly this field of physical therapy. We are as yet unable to reach those doctors who most need our training. Those of us who have had the courage to continue and remove certain objections to our field have found that we have had to do this entirely withstanding the tremendous brunt of disrepute and condemnation that have been thrust upon us; withstanding all of this we have, from sheer courage, continued because we knew that we could accomplish these results.

I feel just as you have said, it is a question wholly of properly eliminating those things which we cannot do satifactorily, and bringing to the fore those things that we can do by physical means.

Dr. Goldman (New York): I am going to discuss Dr. Fowler's paper perhaps from another angle. It may appear to you irrelevant.

It so happens that I am engaged in a vocation in addition to my practice of otolaryngology which brings me in contact with a new concept of the practice of medicine. The tendency with physiotherapy is that men will gradually hire technicians to carry on their work. That is the same as the x-ray men who have hired technicians to carry on their work, the same as the hospitals have hired nurses to administer anesthetics.

It might interest you to know that the physiotherapists of this state — the non-medical men I am referring to — have organized and have now presented a bill in the last legislature and will do it in this legislature, to permit them to practice physiotherapy without the supervision of you men and women. They are forming a national organization today to do the same thing all over the country. At the time the Webb-Loomis Bill was brought up in New York City they fought to be called physiotherapists and not physiotechnicians. These men and women were sponsored by you, men and women in the profession.

There is a bill introduced, it happened about four years ago, by the Nurses' Association of this state with the idea of making it illegal for anyone who is non-professional or non-medical to administer anesthesia. The hospitals of this city sent up the superintendents and the lawyers to argue that the administration of anesthesia means nothing more than dropping ether or chloroform on a mask, or else turning a valve on a machine. They have already organized, they have gotten an opinion from our own attorney in the City of New York, that is, of the County Society, Mr. Dawson, so that they may be permitted to practice anesthesias without the supervision of a physician.

The x-ray technicians have organized in a state and federal society to give them the right to carry on diagnosis and to do x-ray work without the supervision of the physician. Sooner or later I expect to see those men who have large practices and who find it expedient to do a large volume of business, hire technicians, and sooner or later the same problem will present itself to you.

The problem is this, whenever and wherever non-medical groups have attached themselves to the practice of medicine these groups have not only become non-medical but anti-medical. They carry on a propaganda among the lay people against the physician.

When I hear men and women, in public and before medical organizations, get up and sell the idea of electrocoagulation of tonsils and tell you the tremendous amount of work they are doing and the effect and the results that follow — well. Unless you are a little less provincial-minded than you have been in the past you will have the same abuses attached to the practice of physiotherapy in our specialty.

Dr. Edmund Prince Fowler (closing discussion): I have nothing to say except to thank the discussers and maybe to point out that, after all, the nurse anesthetists and other anesthetists are under the guidance of the operating surgeon. The surgeon is responsible for the way that anesthesia is given, although he is not giving the anesthetic. The same thing should prevail in physiotherapy, but unless the physicians throughout the country are familiar with what can be done with physical means of treatment as they are with drugs and other methods, it is going to be very difficult to elevate this specialty to the height it should attain.

Of course, it is getting there, and, as Dr. Silvers said, we are building a foundation, or you are building the foundation. I only wish to speak a few words of caution, because I hear the other side of this question so much. What I have said in the paper was mild as compared to what is said. So, do not think that I am in any way antagonistic to any method of physical therapy. I have used physical therapy and am now using some in my daily work. I shall continue to use physical measures and to experiment with them. But, that does not relieve me from the necessity of always keeping in mind my surgical knowledge, making physical therapy *one* of our means of conquering disease and not the whole means.

IS ELECTROSURGERY OF THE TONSILS A RATIONAL PROCEDURE? *

FREDERICK B. BALMER, Ph.G., M.S., M.D.

CHICAGO, ILL.

Before elaborating on the question embraced in the title of this paper, I desire to preface my remarks by certain definite statements. I do not wish to be misunderstood, for one who is misunderstood is frequently misquoted.

For the past sixteen years I have removed tonsils by surgery and I am still continuing to employ this method of tonsil removal. The advent of other methods has always met with disfavor, whether or not such methods possessed any merit. Efforts have been directed to find a good substitute for surgery, not because surgery is undesirable, but because it often is contraindicated. In electrocoagulation the surgeon has finally attained a safe means of extirpating the tonsils, fully appreciating, however, that careful and correct technic is essential to satisfactory results. Incidentally, electrocoagulation serves also as an indispensable adjunct to surgery. The numerous incomplete tonsillectomies and regrowths of lymphoid tissue, whether from one cause or another, call for some procedure, preferably non-surgical in the strict sense, to aid in the perfection of end results.

I contend that when a patient comes to you and in all sincerity refuses to submit to the surgical removal of his tonsils, that patient is entitled to the best substitute we have to offer. In my opinion this is electrocoagulation.

Five years ago, our better medical journals would not publish articles on the subject of electrocoagulation of the tonsils. Today, they not only publish articles on the subject, but editorialize on them as well. There seems to be a determined desire to rationalize the subject generally and this is indeed a wholesome, conservative attitude.

Electrocoagulation will not replace surgical tonsillectomy because the two methods are not the same in the results attained. In surgical tonsillectomy an attempt is made to remove the tonsils completely with capsule, including also the lingual portion. In coagulation an endeavor is made to remove the cryptic portion and the greater part of the fundus next to the capsule. It is imperative to remove every vestige of tonsil tissue when surgery is employed, because when the connective tissue is invaded, there is scar formation to contend with. This may cover over unremoved diseased tonsillar tissue and produce a more active focus of infection than were the tonsils prior to the attempted removal. With coagulation the effects are not the same. The unremoved tonsil tissue is not covered over with scar tissue, when properly performed.

I want to congratulate the men who are reasonable and have sufficient foresight to handle this valuable aid to classical surgery in a scientific and conservative way. I say conservative because that is the prime essential quality and should be used where conservatism is a paramount requirement. Therefore, do not defeat the purpose of the procedure by endeavoring to remove the tonsil hurriedly. I have frequently explained that there is considerable advantage in utilizing time required for several treatments on the theory that there is a notable systemic improvement following coagulation. This is probably due to the coagulum remaining *in situ* acting similarly to an autogenous vaccine — (author's explanation). There is a defense reaction in addition to the sterilizing effect of the current on the diseased tissue and the removal of a certain amount of diseased tissue mechanically. To overlook this phase of the matter in certain drastic systemic disorders is to miss the issue entirely.

Many results that I have seen following electrocoagulation have not been satisfactory, to say the least, and the reasons for them you know too well. There may be some advantage in leaving a small portion

* Read at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

of the fundus. It does preserve the contour of the structures, especially the muscles, as well as forestalling the compensatory hyperthrophy in extra tonsillar lymphoid tissue so often seen after a completely removed tonsil with no post-operative tonsillar tissue in evidence. The lymphoid tissue of the lateral fold often becomes diseased and causes systemic disturbance much the same as do tonsils. There has been some very laudable work done along these lines. For example: the report of Hollender on the extirpation of infected tonsils in the tuberculous is noteworthy. Many patients were carefully observed in a large tuberculosis sanitarium and the results were such as to emphasize the efficacy of electrocoagulation of the tonsils in very sick individuals without causing any systemic upset.

It is true the surgical procedure has not been perfected to such an extent that it will meet any and every requirement, and both methods have their advantages and disadvantages. I never speak on this controversial subject without acknowledging my own appreciation of what I consider to be a meticulous, fastidious, surgical procedure for the removal of the tonsils, together with the instruments I have devised, the proper use of which preclude complications in carefully selected cases. This has enabled me to receive the good-will and consideration of the best men of our profession without compromise.

As this discussion is restricted within certain limits I refer you to my paper on "Refinements in Surgery of the Tonsils" [1] and other articles on electrocoagulation [2-3] which have recently been published.

I contend that electrocoagulation is the ideal procedure for the extirpation of the tonsils in certain selected cases; and that it is the method *par excellence* for the destruction of recurrent lymphoid tissue whether due to incomplete surgical tonsillectomy or to some other cause. Electrocoagulation promises avoidance of shock and bleeding, no loss of time from routine duties and no need for hospitalization. In those patients in whom secondary operation is necessary, electrocoagulation is more certain to produce a clean tonsillar fossa than surgery when used for the second time. It is possible to remove every vestige of tonsillar tissue, and so long as this is possible, the method possesses definite merit. The method is a rational one only when cases are carefully and properly selected and when the technic is employed according to sound, scientific electrosurgical principles.

My answer then is that electrosurgery of the tonsils *is* a rational procedure, assuming, however, that the operator knows not only the indications but also the limitations. With an appreciation of these factors, and with thorough training and experience, the laryngologist should be in a position to apply this valuable adjuvant to surgery to the best interests of his patient.

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(For Discussion See Page 604)

IS ELECTROCOAGULATION THE BEST METHOD FOR THE REMOVAL OF THE FAUCIAL TONSILS? *

SAMUEL R. SKILLERN, M.D.

PHILADELPHIA

I feel quite confident that the majority of speakers in this symposium will "sing the praises" of electrocoagulation for the removal of the tonsils. I do not agree with those writers who speak of this method as the operation of choice, as in my opinion, electrocoagulation is a poor method at best for the uncomplicated case when compared to several other surgical procedures.

It is true that the tonsils can be removed in their entirety, leaving just as clean a fossa as that obtained by any other procedure, but I cannot see the justification for a multiple step operation when the same result is obtainable by a single seance.

Some of you probably feel that this method is less painful, less of a nervous shock to the system, and does not interfere with the patient's daily duties. That may be true in some instances, but not in all. The reaction, as in surgical removals, depends upon the type of tissue in that particular individual's throat.

If the muscular tissue and mucous membrane are of the soft, boggy type, an edematous sore throat will be produced no matter what method of removal you may use. Conversely the trained singer's throat with firm muscle and healthy mucous membrane will often recover from a total surgical extirpation with little or no discomfort.

Another consideration is the type of patient. The neurotic individual will always be the greatest sufferer, and it is a question in my mind whether the actual progressive dread of the succeeding treatments is not a greater strain on this highly nervous type than the single nervous shock of a surgical removal.

Granted, the more tissue removed at a single step, the greater the nervous shock. Again I raise the question whether or not the accumulated reactions plus the weekly apprehension are not greater than this shock sustained at a single operation. I can think of nothing more nerve-racking than visiting a doctor's office, week after week, to obtain a sore throat when I had just recovered from the previous treatment.

The physician who says that he can remove tonsils without any pain or discomfort to the average patient, is, in my opinion, twisting the truth to suit his own desired belief. Let this doctor have a colleague give him a few treatments, and I think he will change his opinion. I do not care *how* living tissue may be destroyed, just so long as the surrounding tissue is vital and the conscious nervous system functioning, it will resent the insult by pain.

I added electrocoagulation to my armamentarium in 1927. After removing the tonsils of a number of clinical cases, I was rather enthusiastic with the results, and reported them in a paper read before the Virginia Medical Society. In this report I advised the adoption of this method by the laryngologist for those cases that could not or would not have their tonsils removed by the usual surgery, and also to keep this method out of the hands of the charlatan.

To read the literature sent out by some of the manufacturers of the cabinet, or to listen to the talk of the high pressure salesmen, one would think that electrocoagulation of the tonsils was such a simple, easy procedure that a child could almost accomplish the desired results.

The salesman's usual demonstration of the simplicity of coagulation on a piece of raw beef, and his statement that it is just as easy to coagulate a tonsil, is actually ludicrous, and yet how many general practitioners in the smaller towns have purchased the necessary equipment on this demonstration to find that electrocoagulation is a very difficult and dangerous operation, especially in the hands of the inexperienced operator, and the equipment is simply another white elephant?

* Read at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

These salesmen have installed machines in the offices of every available prospect, regardless of his qualifications, with the result that hundreds of men who otherwise would not attempt the removal of a tonsil are trying their removal by coagulation. I say "trying" as I do not believe they will remove the entire tonsil.

I have talked to many laryngologists who are using this method, and they all tell me they have difficulty in removing the last *vestige* of tonsil as it is very perplexing to differentiate tonsil from the surrounding tissue. If the experienced tonsil operator has difficulty, what must the occasional tonsil coagulator have when he reaches that remaining portion of the tonsil stump buried deep in the fossa and covered by a stiffened anterior pillar?

Dillinger, the champion of electrocoagulation for the removal of the tonsils, says, "This method requires more skill and training than the ordinary surgical tonsillectomy, and no one except a throat specialist should attempt to use diathermy in the throat."

Beals speaks of the general practitioner being misled because he believes he can easily master this apparently simple but in reality arduous method, and of the unethical manufacturer adding chaos by sending out high pressure salesmen to sell anyone for the sake of a sale.

Coates, in discussing this paper, advocated the suggestion in my original paper that the laryngologist include electrocoagulation to keep it out of the hands of those who are not qualified.

Myers reported thirty casualties and says it is no method for the neophyte.

In spite of all of this advice and warning by the leading men of the country, the manufacturers continue to install their machines wherever the salesman can procure an order.

When the public learns of the dangers and complications that may occur during the removal of tonsils by electrocoagulation, and what may be even worse, leaving a buried focus of infection from an incomplete removal, it will shun this operation as it would a rabied dog, and the laryngologist will have difficulty in persuading the otherwise inoperable case to accept this method as the operation of necessity.

Occasionally we have cases referred with a history of advanced tuberculosis, exophthalmic goiter, or myocardial degeneration that must have the tonsils removed. Electrocoagulation is their salvation.

Again we have the case that has an actual horror of a hospital or a real fear of a general anesthetic but refuses a local as the sight of the instruments fills his very soul with terror. Here again electrocoagulation has its place, but, for the average individual, electrocoagulation with its multiple applications of the needle cannot be mentioned in the same category with that of a clean surgical tonsillectomy by a trained operator.

Conclusions

I consider electrocoagulation a method of removing the tonsils that every laryngologist should master, as he will find it is necessary to occasionally remove them by this procedure.

It should be spoken of *not* as the operation of choice, but as the operation of necessity.

It is the most difficult and dangerous method in the hands of the inexperienced. The dangers and difficulties are multiple in ratio to the lack of knowledge, and no one who is not capable of removing tonsils by other surgical techniques, and of meeting all complications that may arise during or after the operation, should attempt their removal by electrocoagulation.

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ELECTROCOAGULATION TECHNIC FOR THE REMOVAL OF TONSILS *

GREGG A. DILLINGER, M.D.

PITTSBURGH, PA.

Someone has recently stated that medicine and surgery have made more advances during the past fifty years than in the previous two thousand years of our history. I cannot help but recall, if you will pardon the personal reference, that six years ago before this convention in Chicago, I was almost alone in presenting the simplicity and safety of electrocoagulation of the tonsil. However, since that time, the marvelous and almost unbelievable acceptance and practice of this method throughout the country is borne out by the proof of those participating in the program of this afternoon. To have such men as Balmer of Northwestern University; Skillern of the University of Pennsylvania; Haiman from the staff of a local hospital; Strauss of Michael Reese Hospital, Chicago; Barlow of Rochester General Hospital; Maillard of the New York State Department of Health, is ample suggestion that electrocoagulation of the tonsil is being duly considered as a scientific, surgical procedure.

As my practice for the past six years has been limited to the extirpation of the tonsil by electrocoagulation, I find that it will be hard for me to keep from trespassing on some of the phases assigned to other essayists.

In describing the technic of the application of diathermy to the tonsil, there are three important factors:

1. Anesthesia.
2. Setting of a proper machine.
3. Type of active electrode, and method of its application.

For anesthesia, I use a five per cent solution of cocaine. A small pledget of cotton on an applicator is dipped in this solution once. This is applied to the soft palate, around the tonsil, the base of the tongue and inside the cheek, repeating this procedure three or four times with the same pledget of cotton, but no additional cocaine, not more than four or five drops being used for the whole application. Time consumed is not more than a couple of minutes. I have made more than ten thousand applications of cocaine in this manner to patients ranging in age from five to eighty-two years, in various stages of tuberculosis, kidney affections, and all classes of heart complications, and as yet have never had a patient faint or show the slightest sign of syncope. I treat many cases without any anesthetic whatever. A few months ago I had three doctors as patients, and after the first treatment never used a drop of cocaine nor any other anesthetic in their throats. You can readily imagine that this method is rather painless, when you can successfully remove the tonsils without any anesthetic, from a physician's throat.

I have never seen a throat so sensitive, nor "gagging" so pronounced, in which it was impossible to completely eradicate the tonsil. In such throats speed and dexterity are more essential than anesthesia.

I shall only mention, but strongly object, to the injection of novocaine as an anesthetic. In the first place such complete anesthesia is unnecessary. Second, there is a slight danger from the anesthetic. Third, more fluid is added to the field which you wish to dehydrate; often the presence of this fluid causes as much reaction if not more than you will get from your coagulation. In a few cases of very young children under seven years of age, where surgical procedure is contraindicated, I use gas and oxygen.

For *technic*, or proper setting of machine.

You notice I say a proper machine. I mean by this that your high frequency machine should have a speed of at least a million and a half oscillations per second, and should insure a smooth and perfect current to your patient, without spark or faradism. The setting of the machine, such as I use is done in the following manner: Close the spark interrupter points, set the rheostat or the main control to about three-fourth of the full power of the machine, and make a dead short between the medium voltage and the indifferent

* Read at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

outlet with one of your cords. Now turn on the current and open the spark gaps until your milliampere meter reads twenty-eight hundred. The second cord connected to the needle is attached to the other diathermy outlet. Now your machine is set for the day, and you know your exact meter reading. The setting of the machine should be done each morning by the doctor himself.

As the tonsil is made up of lymphocytes with very little organized tissue, we have found that it is speedily and easily coagulated by this amperage in from two to three seconds, which is definitely determined by the appearance of a whitened area around the needle.

One diathermy cord is connected to your machine, and the other end is connected to a piece of heavy block tin, 6″x10″, which is placed on the patient's back directly in contact with the skin. Great care must be exercised in seeing that no clothing is between this tin and the skin, otherwise faradism will take place. No soap, grease nor salt water application to the tin is necessary. The second cord connected to the needle is attached to the other diathermy outlet.

Our *third* consideration: Type of active electrode, and method of its application.

I shall now describe the three simple instruments, I use in my method. First, the tongue depressor made of pyrex, slightly " S " shaped, is a non-conductor, very durable, and easily sterilized either in boiling water or alcohol. The pillar-retractor, made of pyrex, has the same advantages and is very reasonable in cost. I use a single needle, slightly curved at one end, encased in a movable rubber sleeve; the upper end of the sleeve is pulled up over the lower end of the handle in which the needle is locked so that it can neither turn nor be pulled out. I prefer the use of the rubber sleeve to a needle coated with bakelite, as by moving the sleeve upward or downward, we can more easily regulate the depth of penetration into the tonsil. This rubber sleeve, of course, is for insulating purposes, thus protecting the tongue and other structures from being coagulated.

Another small detail of technic is to place the needle in the holder before your patient enters the operating room; this saves the patient that extra moment of seeing you prepare your instruments.

I consider it absolutely impossible to treat a tonsil without the assistance of a well-trained, intelligent and skillful nurse. This is one of the important features for the success of this method. She must be very gentle in retracting the anterior pillar, very deft in quickly getting in and away from your point of attack. A poorly trained nurse in this particular work can bungle up your whole procedure.

Now as to the operator himself. Although to one who is just looking on, this method seems no more complicated than sticking a pin in a pin cushion, the following are the factors that must be synchronized and done automatically while you are using only two to three seconds in the coagulation of the tonsil: 1. After the throat is cocainized, a very important part of the technic is to have your foot-switch under your foot, and by testing it, have it under absolute quick control. 2. You must have perfect illumination of the throat. 3. With your tongue depressor you have the tongue out of your field of vision. 4. You must observe that the nurse has the anterior pillar properly retracted, and that she is not obscuring your vision. 5. The proper insertion of the needle. 6. Now press your foot-switch and in from two to three seconds observe your coagulated ring or area around your needle, and then immediately close the current.

These observations must all be made as stated above, at one and the same instant, and if done properly very little if any gagging takes place.

Another very important matter of technic; to secure the confidence of your patient before and during the first treatment. I thoroughly explain especially to children and the very nervous patient, the taste of the cocaine, the sensation of fullness and numbness in the throat occasioned by its use; I press on the foot-switch, so they will understand the nature of the buzz of the machine, and then place the needle in the most accessible portion of the tonsil, so that I am positive the first application will be absolutely painless. Now the patient at once relaxes, and realizes that it is going to be a very simple affair; and, as a rule, in these cases, I do not make more than three or four punctures at the first sitting, so that the patient will have very little reaction during the coming week. When they come back for their second treatment they are very much composed and pleased.

After eight years experience with this method I find it more expedient to remove a small amount of tissue at each treatment thus necessitating more visits from the patient. Where I formerly removed a tonsil in four or five treatments, I am now using from six to ten treatments to each tonsil, and find that I have no trouble in keeping my patients at the task, because they fully understand that I am giving them these extra treatments and time, simply for their comfort. The result of this is that I never have a patient with sufficient reaction to prevent him from eating regular meals and pursuing the usual routine of his life. It is rare, with the exception of the extremely large tonsil, that I make more than four or five insertions of the needle at a sitting. After two or three treatments, regardless of the size of the tonsil, we begin to get back near the anterior, posterior and external muscles of the throat. In order to make these insertions less painful, the needle must be inserted more superficially, in other words, not to take too deep a hold, and maintaining a distance of an eighth of an inch, or a little more than the diameter of the needle away from any of these muscles, because we get a coagulation extending slightly beyond the diameter of the needle.

I want to emphasize right here, two points, which I am sure by observing them, you will save many extra sore throats:

1. The point of the needle must be slightly turned away from the nearest muscle.
2. Have great respect for the posterior muscle. This muscle seems extremely sensitive and will become very edœmatous on the slightest coagulation.

The upper pole of the tonsil is very easy to coagulate if you insert your needle and then turn its point slightly toward the anterior pillar and retract downward. The lower pole, which often extends quite a distance down, even below the tongue, can be removed with great ease, but the insertion of the needle must be made with the point turned upward. If you should turn on the current with the point of the needle hooked into and turned downward, more than likely you would get a serious instant edœma, because of the looseness of the throat structures in this locality. Years ago I experienced this, and before I removed my needle a large blue edœmatous balloon-like area as large as a plum had occurred.

I never remove the plica. This is more or less semi-fibrous tissue and is more sensitive than tonsillar tissue. So by having the nurse retract the plica it is very easy to hook into any adherent tonsillar tissue, or sometimes by simply laying the belly of the needle against this tissue, to remove all particles of tonsil without removing any particle of the plica. This same method applies to the removal of adherent tonsillar tissue to the anterior and posterior muscles of the throat.

There is no special technic for the removal of small submerged tonsils, except that your initial treatments should be very slight, only two or three punctures being made. After one or two such treatments, you will then have the tonsil hollowed out to such an extent that your treatments then proceed about the same as in finishing up an ordinary tonsil, keeping a respectful distance from the muscles, and observing the location of the point of your needle.

After each treatment, I paint the tonsillar area with a one per cent solution of acriviolet. I have the patients use a gargle of salt or soda solution twice a day. If they have an extra sore throat, a gargle with aspirin water, or the chewing up of an aspirin tablet and swallowing it with the saliva two or three times a day, is found helpful. I always tell the patient if the discomfort is great to use an ice bag, but I do not recall this necessity within the past three or four years. Also instruct your patients that after the first treatment the surface of the tonsil will be covered with pus, which will continue for a week to ten days. This is a superficial infection, and needs no extra attention except as outlined above. They are cautioned not to make any attempt at detaching this pus membrane, as this could occasion some bleeding.

Some final conclusions. Do we ever get any hemorrhages or severe bleeding? Out of some seven thousand treatments a year, I may have six or eight patients who will have bleeding. This I believe, (but do not know it to be a fact) is due to two things, either undercoagulation or a premature detachment of some of the superficial pus. When this arises, if the bleeding is slight, we remove any clot that may be in the fauces, and make an application of twenty per cent solution of nitrate of silver. If the patient should have a slow coagulation time, or be a known bleeder, we

may give an injection of ten or twenty c.c. of Coagulin Ciba, and repeat *ad libitum*, and then coagulate the bleeding point with our needle, which in fact is all that I usually do. In more than 40,000 treatments I have found that this bleeding is simply capillary oozing, and in all cases is very easily controlled. I have never encountered a "spurter" nor have I ever had to make a night call on account of bleeding. If, and when this does happen, I simply instruct the patient to apply some ice to the throat, and in the morning come into the office.

If the above technic as outlined is followed, you must get nothing but a satisfactory result. There is no portion of the tonsil nor any area in the tonsillar faucæs which cannot be reached with this slightly curved needle. There is absolutely no contra-indication to the use of this method.

After our final treatment, I have the patient return in six months for inspection.

This method cannot be used successfully by anyone except a throat specialist, one fully acquainted with the anatomical structures of the throat, and one who is trained in the manipulation of instruments in the throat. As I have stated before this method looks very simple when you are watching one who is accustomed to its use, but having been in the throat work for almost thirty years, I think I can authoritatively state that it requires more skill, deftness and experience to remove tonsils by diathermy than by the old surgical procedure.

(For Discussion See Page 604)

END RESULTS OF ELECTROCOAGULATION OF TONSILS WITH A BIACTIVE ELECTRODE *

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NEW YORK

After listening to Dr. Skillern and the others engaged in this symposium I have decided to lay aside my paper and just give you a few practical points.

Relative to our New York members, I know pretty well the feeling of the New York nose and throat men. Most of them are adverse to any electrocoagulation. The men I have come in contact with, who are prominent in the ear, nose and throat services of the different hospitals are very prejudiced to this procedure because they have not given to it the consideration which it merits.

I can see before me some of my good friends who are adverse to anything attempted or written on the subject. Those of us who are doing routine ear, nose and throat work should be in a position to know when a tonsil is completely or only partially removed.

Personally, I was very adverse to electrocoagulation for many years when I was in charge of the morning service at the Polyclinic Hospital and worked on Dr. Harris' staff at the Post-Graduate. I see some of the men here who were associated with me on that same staff. I felt, as Dr. Skillern and Dr. Balmer said, that probably this was in the hands of the charlatan and the untrained man who was not competent to do the orthodox surgical tonsillectomy.

There are many patients who will not submit to an operative procedure, or they are advised by their doctor not to submit to surgery. I have a patient at the present time with coronary sclerosis. I have also a patient with tuberculosis and two who are hemophiliacs. It is this type of patient who does well by electrocoagulation.

You might say that I am here to talk on the end results. Inasmuch as this controversy has come it is difficult for me to limit my discussion to the subject which I have originally selected.

I never tell the young adult to have electrocoagulation unless he has some definite cardiac involvement or some other disease

* Read at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

which would make surgery unsafe. We do cardiac patients daily by surgery and find that they do very well, especially when care is taken with the anesthesia. Shock is negligible providing speed and caution are observed.

On the other hand, we find there are a definite number of patients who present themselves to us, men of 50 and 55 years of age, that will not submit to any operative procedure. It was because of this condition that I adopted this procedure. I felt that it would be a valuable addition to my therapeutic armamentarium and that if I perfected myself in the technic I could use it advantageously.

In my earlier experience I followed the technic as laid down, but was not fully satisfied with it. It was not until the biactive electrode was perfected that my results were improved and I became more enthusiastic about the method.

The biactive electrode possesses definite advantages and does away with the need of added equipment. The indifferent block tin electrode, usually applied to the patient's back is unnecessary. Both the active and indifferent electrodes are represented in the two needle prongs.

The method is a very safe and sane one. It has great merit provided it is used correctly by one who has given it sufficient study. It is regrettable that the post-graduate schools are not offering courses in this work so that those who are interested in it can receive proper training under expert guidance.

One of the men talked of hemorrhage. If you coagulate the plica or any of the reflections of the mucosa severe pain will result. Some secondary bleeding also may be experienced when the slough separates prematurely.

You may say that the procedure is time-consuming. The time that the patient gets to your office and the time that he leaves usually amounts to 15 or 20 minutes. On the other hand, he consumes more time when he has an ordinary operative procedure because he is laid up for three or four days. It is only in rare instances when electrocoagulation is employed that we see one with a sufficient amount of pain to necessitate the missing of a meal or being off from work. In my work I do not know of any patient who in the last year has missed time from work or has missed a meal. Occasionally, some have complained of a little pain, especially when the pillars have been sparked.

I have not, however, observed any edema of the soft structures of the pharynx. I do not see how edema could result unless by overcoagulation. It should not occur in competent hands.

As Dr. Skillern brought out, the end result is not always a clean fossa. It is not as clean as a well-performed surgical tonsillectomy which can be done in a very few minutes. Then, why do it? I have already answered. A certain group of individuals flatly refuse operation. They are entitled to the best substitute for surgery, and in my opinion as well as that of many others, this is electrocoagulation. Most of these patients suffer from some systemic disease for which the tonsils have been condemned as a focus of infection.

I will mention one case, that of Dr. Gerard Moench of the Post-Graduate Hospital. He had an arthritic involvement. The doctor was very adverse to having any operative procedure. He was familiar with electrocoagulation because he was using it on other parts. After the third treatment, although all the tonsil tissue hadn't been removed, he showed definite improvement so far as the arthritis was concerned.

There are one or two areas which are difficult to approach, and one is the reflection of the posterior pillar. With the biactive electrode it should be relatively simple to approach it from any angle. One must become adept with his left hand. When he is approaching the left tonsil it should be in a horizontal fashion. I rarely ever use a tongue depressor.

One should first acquaint his patient with proper breathing. If the patient breathes properly — and you should show him how to take four deep breaths instead of two, holding the second inspiration — he will not gag.

As far as end results are concerned, I can best prove my point by the demonstration of dozens of cases. I have about fifty cases that I have completed. I invite you to examine these cases at the Hospital for Joint

Diseases. I had some of the Manhattan men over at the clinic in May. They do their own reflecting of light and their own pillar retraction.

We do not, in the usual case, have a tonsil fossa as clear as we do by an orthodox tonsillectomy. You may find a little thickening of the anterior or posterior pillar. I do believe that these cases that we send out of our office are practically free of lymphoid tissue.

Let me say one thing in conclusion. If you are going to do this work you must take as much time in training for it as you would for any other surgical procedure. It may take you even longer to master this technic.

Five per cent of the patients whom I have done have been referred to me by my medical colleagues. Every one of them goes back to his own doctor for final inspection.

(For Discussion See Page 604)

CONSERVATIVE ASPECTS OF TONSIL COAGULATION *

JEROME F. STRAUSS, M.D.

CHICAGO

I desire to make my position clear to you. I come before you as a conservative otolaryngologist who has made a sincere effort to broaden his sphere of usefulness by acquiring a new, and I may say revolutionary method, of removing tonsils. I have made a serious and practical study of the procedure, approaching the subject with a broad and open mind, making a fairly exhaustive study of the literature, visiting centers where electrosurgery could be observed in satisfactory quantity and quality, and, finally, personally performing the operation in clinic and private practice.

In making such efforts it was necessary for me to combat a considerable amount of deep-rooted antipathy. I had been a witness, from the outside, to the birth of the technique, and had watched with aloof interest the development of the infant, with its swaddling clothes of tons of pseudo-literature, and my reactions, like those of many of us, as I first came in contact with electrocoagulation, were hardly favorable to the procedure.

You will agree that the situation not many years ago was scarcely conducive to the enthusiastic adoption of the method by conscientious conservative practitioners. I recall the patients who, having undergone such treatment, required later complete surgical tonsillectomy, and in whom, cicatrized fauces and sealed infected crypts were in evidence. Such was the character of the end results displayed in alarming frequency. As to the quality of the work done, we, on the outside, had, as our only material for judgment, the literary output of countless mushroom authors turned authorities over night, whose product flooded the second and third rate medical periodicals of the country. And finally, as further evidence of the obstacles which it was necessary to overcome, I mention my attendance at certain sessions of national physiotherapy meetings to hear scheduled papers on the subject, and my resulting disappointment to learn little of the treatment as such, or of its advantages to the patient, but to be told instead, the advantages, financial and economic, accruing to the practitioner of the method.

Fortunately the picture has changed. I need not recount here the details of the metamorphosis; they are self-evident in the character of meetings such as these, in the caliber of the men now investigating and adopting the method, and in the improved scientific standard of the articles now appearing in the foremost medical periodicals. It is in the hope of giving further impetus toward the betterment of the situation in general, and to assist in a small way to attract the serious consideration of the large number of highly spe-

* Read at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

cialized conservative otolaryngologists who refuse to contemplate the possible usefulness of coagulation in the field of tonsil surgery, that these remarks are offered.

I have no intention of taking up your time with the details of technique, nor with a repetition of the generally accepted indications for its use. Your method may differ from mine, but you have developed yours and are thoroughly familiar with it. You know its value and its limitations as I know those of mine, and we may assume that our end results are very similar. The matters I wish to bring out for discussion or silent consideration tend more toward intramural political conditions than toward the scientific, and I raise them because of my belief that any action taken in the direction which these suggestions offer, would be tremendously effective in aiding to efface the great indifference which exists in so many quarters regarding electrocoagulation of the tonsil. I am further of the opinion that the popularizing of such principles could rapidly increase interest and attendance at these annual gatherings, just as the sudden influx resulted when certain papers on the subject first carried conclusions stating that diathermy was not the method of choice in normal adults free from complicating risks. It is certain that only under such a standard can we expect converts to the method from the orthodox conservative group to carry on their work in this field.

I wish to make a plea for the abolition of the spirit of intolerance and for the further elimination of the narrowed viewpoint of the overenthusiastic practitioner in this work. There are, of course, a number of reasons for the widely divergent and dogmatic opinions regarding the relative value of orthodox tonsil surgery and electrocoagulation, and the fundamental basis for practically all of them, as we hear them expressed on the platform, or read them in our journals, is a type of intolerant fanaticism — a refusal to evaluate with broadened vision the merits of the one and the other, under varying conditions of economic necessity, the patient's individuality, and primary principles of efficiency. It is well to be conscious of the reaction to such narrowness on the medical profession at large and on the educated and thinking patient who seeks our counsel and service.

The enthusiastic worker in this field must realize that the efficiency of surgical tonsillectomy varies greatly in the various geographical communities, and in the individual practitioner within the community. In many localities one knows that poor, incomplete, and destructive operations are routinely done, and that in other centers unsatisfactory work is rarely turned out. To a great number of conscientious well-trained otolaryngologists tonsillectomy is a truly surgical procedure and not a haphazard snip-snare-and-bleed routine. It is true that in the occasional case the results are not what were to be expected, but it is a fallacy to believe that these highly trained operators have other than a high percentage of splendid surgical results. In the modern operating rooms of innumerable communities the up-to-date surgical tonsillectomy is a ten to fifteen minute operation including the time necessary to effect an efficient painless local anesthetic, a complete enucleation (and I mean practically always complete in the setting which I describe) with a minimum of trauma, a maximum respect for tissue, and an orderly surgical technique of hemostasis. From the patient's standpoint a few hours of severe pain, usually controllable, a few days of discomfort and then through. Contrast this with the effect on the thinking intelligent patient who is forced to return week after week for repeated coagulations especially in the monotonous final stages when progress is necessarily slow and tedious. In a community where good surgical procedure is the rule, can one conscientiously recommend routine electrocoagulation?

On the other hand, let us consider those numerous spots on the map where the higher degrees of surgical competence do not obtain. It is possible that the practitioner in rural communities — or in urban communities for that matter — who has seen patient after patient mutilated, incompletely operated, or placed in jeopardy by poor surgical management, has, with the diathermy apparatus, a method at hand which actually raises his efficiency in the elimination of offending tonsils. Certainly he can, in a varying number of sittings, using the improved and simplified machines now on the market, accomplish far more for his patient, on far less training and with no danger to his subject than he can expect his patient to receive at the hands of the mediocre surgeon. If he is well grounded in the anatomy of the tonsil and a few basic principles of technique he can go ahead; if he

meets with an individual problem in any phase of the work, he can stop at once, with no harm done, and have plenty of time before the next sitting to decide how to cope with it. Not so the inexperienced surgeon, whose sudden problems become serious emergencies. Personally, I should be far less apprehensive having my tonsils removed by an inexperienced but conscientious coagulator than to undergo tonsillectomy surgically in the hands of a surgeon of corresponding grade. The point has often been brought out on the floor of these conventions. Last year in Omaha, a gentleman in opening the discussion of one of the program papers said: "For some time I have been coagulating tonsils . . . . . The reason I began doing it was because of the results from surgical enucleation in my part of the country."

I hope the conclusion I wish to draw is clear. The opinion of the conservative surgeon is, and will continue to be, in the present status of electrosurgery, if he has interested himself in the subject in any seriousness, that the field of tonsil coagulation is limited to the destruction of tags, remnants, and post-operative recurrences, and to primary tonsil removal only in the aged and those constitutionally unfit for regular surgery. On the other hand, it is necessary for the strict conservative holding this view, to appreciate that it is possible for geography and circumstances to modify such a declaration of principles, and to realize that there may exist many communities in which patients are far better served by elecrocoagulation than by surgery. I bespeak then a tolerant attitude on both sides of the question, for the purpose of merging rather than diverging scientific endeavor in a common field.

My second point is also on a phase of intolerance, closely related to what we have been discussing, as it occurs in the literary output on the subject. Already the influence of this rapidly growing association is becoming apparent in the improved quality of the papers now being published, but even in this new standard of quality it is remarkable how few writers can refrain at some point in their expositions from reverting to characteristic utterances so common in the literature a few years ago, and it is my opinion that attention to this factor with the controlling influence which this organization can develop, is a most important element in reaching a goal which will attract more and more the men of high standing in the medical world to the field of diathermy. You can not gain the attention of orthodox conservative surgeons who still think that coagulation means cautery with its consequent cicatrices and sealed infected crypts, nor can you regain the interest of many colleagues who have endeavored to adopt coagulation with insufficient basic knowledge and experience, and who as a result "openly disqualify the procedure and voice their sentiments against it;" you cannot, I repeat, awaken interest in these men through any more positive medium than our periodical literature, and this could never be accomplished by the character and quality of a large percentage of papers in the comparatively recent past. Few were scientific, many unconvincing; a large group were mere repetitions of better expositions already published, and in almost all of them appear overenthusiastic outcroppings of intolerance toward medical colleagues with differing beliefs.

Fortunately, as has been said, a great change has taken place and the standard of publications has been elevated to a new and far more satisfying level. Witness the many splendid articles that have appeared so far this year. I raise the issue however because the tendency still persists, and permits the zeal of the pen to overstep scientific purpose with gestures of intolerance which do much to defeat the ends in view. One of the closing paragraphs in a recent article of merit, published in the *Archives of Physical Therapy* is as follows: "Sacrifice plicas and capsules if necessary — but to remove a pillar denotes lack of skill and carelessness. Leave that to the general physician or surgeon who not infrequently is adept at their removal." Such half-truths and intolerant statements appear all too frequently in otherwise acceptable papers, whose character and quality and whose scientific probity would be greatly enhanced if they were left unsaid. Another example comes to mind in which a similar criticism is invited. This was a conclusion reached in a paper published a few months ago in the same journal. I quote: "Much more time and effort is necessary to master electrosurgery technique than that of ordinary surgery." How do you think such a statement, probably thoughtlessly made, would react on the conscientious surgically trained laryngologist, who is doubtlessly well aware that there are now on the market high-

grade, compact, simplified, and efficiently foolproof diathermic generators, the use of which, coupled with his already comprehensive knowledge of the anatomy of the tonsil, would enable him in a short space of time to accomplish satisfactory coagulation treatments. Judging from the conversation of many surgeons and specialists with whom I come in contact, it is such references as these that become a factor in keeping many of our colleagues from investigating seriously the advantages of electrocoagulation.

I believe that this thought should constantly be kept in mind by the publication committee of this organization. The members of the committee have excellent opportunity of controlling overenthusiastic utterances, and of eliminating intolerant tendencies, in the papers submitted for publication. I believe that such a restraining conservative influence on articles brought out under the patronage of this association would prove a great step toward the objective of elevation of standards, and tend to attract in much greater degree than heretofore those who do not know, or refuse to appreciate, the place of electrocoagulation in modern tonsil surgery.

Finally I wish to offer a third personal reaction. This is of more practical or concrete application and relates to the use of coagulation from the standpoint of the conservative laryngologist who practices the method with the usual strict and limited indications for its use. My experience leads me to believe that in the course of time, as more members of the profession take up this work that attention will be called to the futility of carrying the procedure to complete conclusion in the type of case in which the method is indicated. It was apparent to me almost from the beginning of my work in diathermy that very early in the course of treatments the end I had in view was reached long before marked visible changes had occurred in the tonsils. The generally conceded sterilization of the infected focus, or the vaccine-like action of the killed bacteria remaining in the crypts, produced remarkably prompt improvements, and the passing of time showed that this effect was permanent and not coincidence. As I carried a growing number of patients through the protracted final stages there grew in my mind an increasing consciousness that the monotony of the terminal stages might be an entirely unnecessary phase of the treatment. Some patients, advanced in age or disabled constitutionally, already relieved of the symptoms for which they came, resisted requests to return for further treatment, some openly rebelled and refused to yield further to my efforts. I began to feel that, in a sense, I was violating a conservative ethical principle in that I could accuse myself of giving actually unnecessary treatment after I knew that the infectious foci were removed and a mere paper-thin layer of tonsil tissue lined the fossæ. The patients under treatment were, to begin with those in whom orthodox surgery was contraindicated. Had I not served every purpose when the crypts were removed and the residuum rendered innocuous? Had I not rendered an efficient service to this group of patients for whom no corresponding relief without danger of morbidity or mortality could have been offered a few years ago? I began to speak less of tonsil removal by coagulation and to emphasize the procedure as elimination of the tonsil as infective foci, and I put the idea into practice depending on the circumstances involving individual cases.

Being unaware of anyone deliberately practicing this efficient yet partial tonsil-removal, I read with considerable satisfaction Frederick Balmer's article last spring in which he devoted some space to just this practice under the title " Diathermocryptectomy," and I fully agree with him when he states: " I am not sure that the future will not warrant more attention to this procedure." In my opinion it is a definite step in the further elimination of the remaining untoward effects of the superenthusiastic hysteria of the early days of tonsil diathermy, and will serve to awaken the curiosity if not interest among the uninitiated in the conservative element in medicine. Here is a simple procedure, markedly efficient in its results and requiring a relatively brief period for its accomplishment. Can the conscientious practitioner in the field of tonsil surgery afford to be without this means of serving those patients whose physical condition prohibits tonsil removal by orthodox means?

I have taken the liberty of making this informal expression of conservative considerations with an earnest purpose. I have found that many men with whom I associate, and others whom I have questioned on the subject, have been little interested in it in recent years and have expressed themselves rgarding it

quite unsympathetically. The frequency and similarity of the response to inquiry leads one to infer that such views are very widespread. Ever since I have satisfied myself of a definite place and definite indication for tonsil coagulation in the practice of the most orthodox of practitioners, I have felt that many more high grade men would be attracted to — and become cognizant of — the value of the procedure, if a more definite exposition were made of its indications from two separate standpoints, i.e., that of the trained surgical specialist and that of the practitioner, who has inadequate surgical facilities at hand. Secondly, I believe that such attraction would be markedly increased by the still further curbing of superenthusiastic statements and intolerant utterances. Such precepts, fostered by this association, will do much to unite the activities of those whose work includes the treating of tonsils by any method, and in such unity is progress.

104 S. Michigan Ave.

(For Discussion See Page 604)

PITFALLS IN TONSIL COAGULATION *

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Physiotherapy is an established and recognized branch of the healing art, and electrocoagulation is an essential part of it. Electrocoagulation is not new, the genito-urinary specialist has used it successfully for years. It is true, however, that comparatively speaking, a new type of tonsil eradication — electrocoagulation of the faucial tonsil, is a method which is here to stay. It has passed the novelty stage and has weathered through a maelstrom of criticism. I feel that I am justified in stating that it is now on a sane basis and is becoming more safe in the hands of qualified men every day.

The public has been educated to electrocoagulation tonsillectomy in a most astoundingly short time. This has been brought about by various newspaper articles and magazine captions. One of the most potent sources of information is through syndicated paragraphs which nearly every newspaper carries, written by a physician in a convincing style with caustic sentences, and, who, regardless of what we may think of him, has a great influence in the guidance of public opinion on medical subjects.

The method of electrocoagulation of tonsils is not as yet perfected. The results are not uniformly good. There are occasionally reported hemorrhages of more or less serious nature and even deaths have been reported. Undue sore throat and peritonsillar abscesses have flared up during the course of treatment, even exacerbations of arthritis, have occurred. In a word, electrocoagulation is not without its dangers and grief. There are stumbling blocks and pit-falls of which unfortunately we are not too well-informed.

The technic of electrocoagulation tonsillectomy, in my opinion, requires more care, judgment and dexterity than the approved methods of surgery. Many men of national repute have tried the method, and after a week or two, have discarded it and become confirmed antagonists. They failed to appreciate some of the possibilities.

First of all I would criticize the salesmen who, in merchandising their product, become over-zealous, and in their anxiety to dispense a machine — become superlative in their statements as to the effectiveness of the apparatus and the simplicity of the method. Some, even outline to the doctor how he shall carry out the technic and even offer to actually do the first two or three treatments for him. The same salesmen offer all sorts of helpful sug-

* Read by title at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

gestions in the methods of handling patients, how to collect, how much to charge, etc.

We, in scientific medicine, have condemned the method of coagulation without investigating. We have based our condemnation on the fact that charlatans, quacks, chiropractors, etc., have bought the machine; we are not logical — for we should say according to that way of thinking that because a bootlegger drives an automobile we, so-called, respectable citizens should walk! The men in "cult medicine" got the jump on us. They saw financial possibilities in the method and adopted it — not with the idea of doing good work, but because they could use it as a money maker. Consequently the regular physician condemned it, unwarrantedly. I think, a reputable physician is timid about discussing the method and has no one but the salesman to consult with.

The second pitfall I would discuss is the positive sweeping statements in the medical syndicated articles. The laity is led to believe this is the only method, and that it is so simple that only one or two sittings are necessary, and in five days one expectorates his tonsil and behold! A tonsillectomy has been performed!

The operator must realize that he should coagulate only small areas — in an attempt to hurry, one is apt to do too much at a "sitting." The result is that considerable soreness results and if a large slough comes away it may be followed by more or less severe bleeding.

A third danger is in the use of local anesthetic. This is especially true when the tonsil surface is swabbed with cocain. There is the danger of using too much or some may be swallowed. The treatment may be followed by severe gastro-intestinal symptoms. Some of us are now using no local anesthetic at all.

The fourth pitfall is the operator's lack of knowledge of electricity and the physical properties of the living tissue — its resistance, etc. Until one has used the method a considerable time one is apt to coagulate too deeply. The tonsil, as such, is not very sensitive — if we keep within the capsule we are not likely to have post-treatment pain. If we coagulate into the substance of the pillars we are sure to have a stormy reaction.

The time element is very important. It is well to allow sufficient time to elapse between treatments, in order that the reaction will completely subside. Too frequent treatment is likely to keep a sloughing base, and so render it difficult to judge the depth of penetration.

An additional warning should be given as to location of needle punctures. The active electrode should be kept well within the tonsil area and avoid involving the pillar.

One very important factor in the difficulties is — that the machine is purchased and without further ado the physician begins to institute treatment on a private case. There are, as yet, no clinics nor classes where a physician may learn to apply the therapy under competent instruction. The method looks so simple that it is deceiving. It is only when one actually begins to work that one realizes the numerous pitfalls, and if too many obstacles present themselves, he is apt to throw the method aside and become an antagonist.

Still another hazard is the fact that when we encounter a patient just recovering from tonsillitis and institute diathermy treatment we may precipitate a quinsy, an arthritis, or some other evidence of focal infection.

The electrocoagulation method of tonsil removal is admirably adapted to certain cases and conditions in the hands of men trained in its uses. It is far from satisfactory and even dangerous as used by the profession at large without training.

Thus summarizing the stumbling blocks and pitfalls which are apt to work havoc, we have: —

First, the apparent simplicity of the method.

Second, the sales talk of some salesman encouraging anyone to buy a machine and use the method.

Third, the necessity of developing a technic on private patients and without competent instruction.

Fourth, the tendency to hurry and coagulate too large an area at each treatment.

Fifth, the possibility of coagulating into the muscle and having severe post-treatment pain.

Sixth, the use of too much local anesthetic.

Seventh, the possibility of causing a "flare-up" of old quinsy by not allowing sufficient time to elapse after an attack of tonsillitis.

(For Discussion See Page 604)

ESSENTIAL FACTORS IN THE ELECTROSURGICAL EXTIRPATION OF TONSILS *

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Much criticism, favorable and adverse, has been given the electrical removal of tonsils in the past decade, but as a method, the subject has weathered the storm and has been accepted by those whom we consider recognized exponents of surgery. The excellent work of Novak,[1] Skillern,[2] Balmer,[3] Silvers,[4] and others undoubtedly paved the way for recognition of the method,[5] and today more and more of the conservative otolaryngologists are finding the electrical method very useful. The difficulty in the past has not been due to any fault of the method itself, but to its application, which is true of any technical procedure. Inasmuch as the method has proved itself to be worthy of recognition, our concern today is in the evaluation of the essential factors, which, when applied, will insure a good end result.

We have all learned a great deal from our previous errors and those of our associates who are interested in the development of the technic. I believe that the success of any operator in this field depends on the selection and incorporation into his own method of phases of the technic that he finds best adapted to his individual skill. Much may be learned from the many technics available today. The method which I am about to describe is not being recommended as the only one that will insure success, because I have satisfactorily removed tonsils completely by other electrical measures which have since been discarded.

Technic

The patient having been comfortably seated on the chair is asked to open his mouth and extend his tongue over the lower lip, pressing gently with his middle and index fingers covered with gauze. He exerts a downward lateral traction in a direction which would retract the pillar and expose the tonsil to be treated. Pressure is exerted on the tongue with a wooden depressor attached to an illuminated holder which lights the field. Complete inspection is made of the nasopharynx. The tonsils are expressed, and the crypts cleaned of any debris, exudate or concretions which are collected on a sterile swab for bacteriological study. The tonsils are then swabbed with 1:1000 solution of adrenalin chloride in order to dehydrate the tissues. A local anesthetic is then applied, and a few minutes allowed to elapse before the beginning of the treatment.

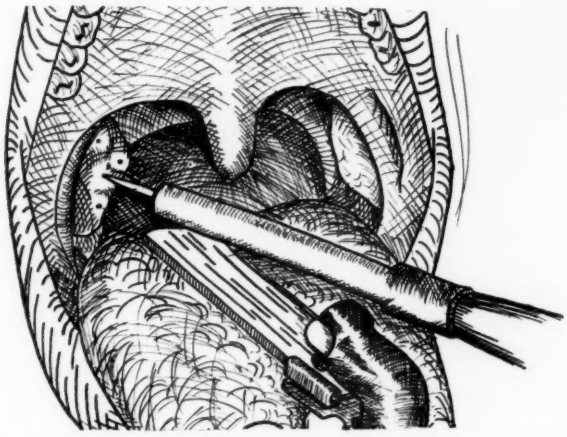
A very important consideration is the choice of a suitable anesthetic. I have used most of the topical anesthetics, and have not been able to find any (except cocaine hydrochloride) that will produce sufficient anesthesia to make the method somewhat painless. As everyone knows, the application of cocaine is always associated with the potential danger of a bad reaction. I have been fortunate in being asked to try the effectiveness of a new anesthetic "Pantocain,"* and the results have been very favorable. One may use large quantities without fear of any bad reactions. The degree of anesthesia is almost comparable to that produced with a concentrated solution of cocaine hydrochloride. I have applied it with a small spray, including the posterior pharynx as well as the tonsils, which has helped somewhat to reduce any exaggerated pharyngeal reflexes.

Equally interesting and informative is the study of the bacterial flora of the tonsils in each case. The relationship of the inciting organism to the post-operative reaction is not quite clear, yet one can assume that the more virulent strains inciting a greater degree of inflammation would be a causative factor in the production of edema and pain following the administration of a heavy treatment. One must be very cautious to give a light treatment, preferably in the form of electrodesiccation or fulguration, when a virulent strain of an organism, for example, a streptococcus hemolyticus, is isolated in the presence of a marked degree of inflammation of tonsils or

* Read at the Eleventh Annual Meeting of the American Congress of Physical Therapy, New York, September 7, 1932.

* Material supplied through the courtesy of the Winthrop Chemical Company.

Fig. 1



Illustrating technic of punctate electrocoagulation of tonsil, position of tongue depressor and approximate size of each zone of coagulation.

pharynx. Some operators might postpone treatments during which time a disinfecting solution is used. It has been my experience[6] that the judicial use of an electrical treatment in these cases has produced the desired sterilizing or attenuating effect in a shorter period of time, thereby permitting the actual removal of the tonsil in the subsequent treatments. In cases where the organisms isolated were determined to be of etiological significance, the use of vaccine was very helpful in hastening a relief of the local inflammation as well as any secondary infective processes that might have been present. A further study of the bacterial flora in relation to electrocoagulation or fulguration should yield valuable and helpful data.

There have been various reasons for the open condemnation of the method in the past, and the greatest number of these reflected on the operator as a technician. Frequently he selected inferior apparatus from which was generated a poorly controlled or faradic current. At other times, good equipment was operated poorly, but most frequently the actual application of the method was at fault. A high frequency current as used in surgical practice is a very efficacious tool in destroying tissue, and obviously when the operator directs the energy to the pillars, uvula or any of the intrinsic throat muscles, destruction takes place, with consequent ill effects to the patient. At other times, too much tonsillar destruction at one sitting has resulted in slough and hemorrhage.

Recognized surgeons of various clinics have seen fit to condemn the method because they have been acquainted with some poorly done work or because they tried it in a gross manner, and not understanding the nature of the energy used, its biochemical effect or anything relative to proper dosage, these operators have naturally failed. One surgeon with whom I am acquainted was opposed to electrical extirpation because he had been under the impression that the method could not completely remove the tonsil. Incomplete removal, however, may be desired among certain schooled men, but if an agent will destroy the upper pole of a tonsil, is there any reason to suppose that the lower pole or base is immune to it? Certain exploiters make a practice of telling patients that they will remove the tonsil in a few treatments, but as a matter of fact, destroy only a portion of it. This practice is obviously bad and invites deserved criticism both from the medical profession and the general laity.

As exponents of electrosurgery of tonsils it is our desire to accomplish a good end result in the shortest possible time and with a minimum amount of embarrassment to our patients. It matters not whether we use the coagulating, desiccating, cutting currents or some combination of these three physical agents, the cardinal factors pertaining to a satisfactory termination hold true.

Most authors on this subject seem to agree that a combination of coagulation and desiccation is the more desirable on the average case, and I am of that opinion. In a gross manner, coagulation and desiccation or ful-

guration are very similar. The former type of energy is burdened with high amperage. Hence, the heating effect or destruction is greater, while the latter having less amperage is not so destructive. The higher voltage, desiccating current is most ideal in the completion of an electrical extirpation, since the removal of many tonsillar shreds is less time-consuming by this application than with the coagulation current.

In the selection of apparatus for this type of work, care should be exercised to obtain a good current devoid of faradic or other irritating qualities. This current should be easily controlled from a very small intensity to various degrees of larger intensity.

Electrical safety both to operators and patient is important. There are various types of machines on the market, some of which are inferior in construction and output. The development of a satisfactory technic has been greatly hindered in the past because of the limitations of the machines at that time available.

An operator after deciding upon a technic, whether it be a biterminal or uniterminal application, should develop his skill to a state of perfection before he actually treats a tonsil. There has been a great deal said in the literature relative to biterminal and uniterminal technics. My own individual skill, however, is such that I can actually work as quickly with the latter method. In my opinion one's skill could be developed with either technic to produce equally quick and efficient results.

The technic as practiced by some of the early workers in this field has varied a great deal. Clarke[7] was a great exponent of electrodesiccation. This sparking or dehydration of the tissue cells has also been used by Novak and Zeller,[8] Power,[9] and many others. Blumberg[10] has used the cutting current to advantage as has Blanchard[11] and Braun.[12] Electrocoagulation has had its followers in Balmer,[13], Haiman,[14] Doane,[15] McKenzie[16] and many others. Each method of application undoubtedly has merit and can be used to advantage at some time during the extirpation, but the surgeon should be careful in his selection and the time of its application. From a survey of the voluminous literature on this subject, it is quite evident that a gradual extirpation of the tonsils has met with the greatest success. Those of us who have been acquainted with electrosurgery for the past few years are more or less in accord with certain factors in this problem. I am of the opinion that treatment of one tonsil at a time, employing coagulation on six to ten areas, with an interval of at least ten days before reapplication, and approximately five to ten treatments before complete enucleation has been accomplished, is the method of choice at present. When inflammation is present, I have found the desiccating current more useful than the coagulating current in the initial treatments, in controlling the destruction of tonsillar shreds, and in finishing up the tissue adherent to the pillars. Occasionally, for tumors, the cutting current has found its place, but as an alternative for coagulation. it has not advanced beyond an experimental study.

Just as important as the actual clinical technic is the selection of a good high frequency machine devoid of faradic or other electrical irritating effects and with enough flexibility so that the intensity of the current may be varied with accurate exactness to fit each individual case. If the skill of the surgeon is such that he can operate efficiently with a current intensity that will produce a blanching of the tissues in from three to five seconds, the machine should be capable of adjustment so that this effect may be produced in the required time regardless of where the dispersive electrode may be applied or whether a biterminal electrode (two active electrodes) is used.

For one who is unfamiliar with the procedure, I would advise the mono-terminal application. With my machine I simply connect one terminal of the diathermy apparatus to a metal chair and without removing any clothing, the patient sits on this chair. The active electrode is then connected to the opposite diathermy terminal and the controls of the machine adjusted to produce the effect on tissue with which the operator may work efficiently. It is better for the operator to first of all acquaint himself with the operation of the machine on various kinds of tissue such as the liver, fat, muscle and tendon, for in this way, he will become accustomed to the various resistances that may be offered by different types of tonsils. After this preliminary training, the operator should attempt to destroy a few tonsillar tabs, and finally he will become sufficiently skilled to tackle a tonsil.

The subject of high frequency is indeed a very fascinating yet complex study. It is a science about which the medical profession as a whole knows much too little, and frequently due to this lack of training with consequent confusing nomenclature electro-medical literature falls into disrepute. The Physical Therapy Council of the American Medical Association has attempted to standardize electro-medical terminology and yet many confusing medical articles on the subject of tonsils appear because of a lack of effort in using standard terms.

High frequency is a very general term and may be applied to a wide range of wave lengths. Some of these waves are short while others are extremely long. If the frequency is high, the wave lengths are short, and vice-versa. In medical and surgical diathermy, the frequency of the current is usually in the neighborhood of 500 to 2,000 kilocycles. Sometimes these oscillations are damped, sometimes semi-damped and at other times the oscillations are undamped.

The frequency and also the wave shape of a diathermy current determine in a large measure its quality. Very little has been written in medical literature relative to current quality but when we find that the difference between a cutting current and a coagulating current is one of wave shape, the question of current quality becomes important. The question of frequency is important because of the muscle effect or so-called faradic effect when low frequencies are used. A highly damped current in excess of 500 kilocycles is most desirable for coagulating purposes. In electrosurgery we should be interested in the destruction of tissue and the degree of destruction. The heat in any conductor is in direct proportion to Joule's I^2RT law. Inasmuch as the resistance in a tonsil will remain approximately constant during the application of the energy, we are therefore concerned with the current and length of time the current is applied. Any variation in either will affect the thermal or destructive effect. Desiccation or fulguration, and coagulation are really nothing more than various degrees of destruction and in each type of current we find a different relationship between the amperage and the voltage. A coagulating current is heavily laden with amperage and is therefore markedly destructive, while desiccating or fulgurating current has a low amperage and is not as destructive. The question of voltage does not enter into the picture as long as there is sufficient pressure available to produce the desired degree of destruction. As a matter of fact, a very high no-load voltage current may not be desirable in the oral cavity as it might interfere with the proper regulation of the current. For my purpose, I employ a machine that produces a low voltage highly damped, high frequency current with means for controlling the frequency and the high frequency voltage. I believe that it is reasonable to suppose that with equipment of this type where the electrical factors may be controlled there is a greater possibility of standardizing electrosurgical technic than with some of the other apparatus.

Many of the disadvantages encountered in the past such as faradism, pharyngeal reflex, undue sparking to pillars and uvula may be attributed in a large measure to poor current quality and improper current regulation. When electrical apparatus becomes so standardized that these electrical factors may be so selected, electrosurgery will gain great momentum in all directions.

Summary

A satisfactory technic that will completely remove tonsils by electrosurgery has been developed. In the development of this technic certain essential factors have been considered. These factors consist first of the acquisition of good equipment, the application of the proper type of high frequency currents at a given time, complete control of the active needle so as not to destroy structure outside the tonsillar tissue, the accomplishment at one sitting only of as much removal of tissue as is compatible with safety, and lastly the use of a topical anesthetic that will produce the greatest degree of anesthesia with the least possible danger to the patient.

Conclusion

In conclusion it may be said that an operator may become quite successful in electrosurgical extirpation of tonsils if he will select and incorporate into his own method phases of the technic which are best suited to his individual skill, keeping in mind always that he should completely remove all tonsillar tissue in as few treatments as possible, with the least possible embarrassment to his patient.

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Discussion

Dr. Edwin A. Griffin (Brooklyn, N. Y.): In a large majority of operations electrocoagulation can be performed without pain. Pain can be eliminated by proper anesthesia and a dry field of operation to prevent sparking. I give each patient atropin before operating to produce a dry field. This is very important. And as a warning in the prevention of pain I advise — keep away from the pillars.

The danger of hemorrhage can be eliminated in most instances by following three steps.

First: Complete coagulation (I always set my machine to coagulate in from one to two seconds);

Second: Coagulation around the circumference of the tonsils one-quarter of an inch from the meeting of the anterior pillar with the capsule of the tonsil. (This immediately closes part of the blood supply to the remaining tonsil);

Third: Finally hemorrhage can be eliminated by desiccating all the coagulated area. (This I do by the following method — I remove both electrodes and insert the active one in the Oudin circuit — I desiccate until I procure a brownish surface over the snow white area of coagulation — not a black surface.)

Dr. Dillinger's technic is superb. I personally employ more coagulation punctures at each sitting. Most people become rather tired of seeing the doctor too often. I try to finish the entire extirpation in five or seven treatments.

After trying all the anesthesia I finally concluded that five grains of cocaine to the drahm making an eight and one-third per cent solution to be the best. I employ a fresh swab at each application, swabbing every five minutes for three or four applications. I cocainize only one tonsil at the first application, and then if the patient shows no ill effects, I proceed to do both tonsils at each subsequent application. I also swab the entire buccal cavity once with adrenalin solution and give each patient atropin before operating to produce a dry throat. This eliminates sparking.

I employ a tongue depressor and pillar retractor which are not insulated. I found that with the insulated instruments I gave the patients sparking when my hand touched their chins. I employ a straight needle for the first step, and a curved needle for the following steps.

At the last treatment I apply a tonsillar forcep in the tonsillar fossa to pull the capsule to the median line. This brings all the remaining fragments and the capsule plainly into view for coagulation.

To keep my dignity and good nature in the office I do not attempt coagulation on children under ten years of age.

We all owe to Dr. Barlow a vote of thanks for his complete paper on Pitfalls of Tonsil Coagulation. I would suggest that each firm dealing in high frequency machines distribute a reprint of this paper to every physician entering into the field of electrocoagulation for the removal of the tonsils.

Peritonsillar abscess following a treatment of the tonsil is due in all cases to inserting the needle into an infected crypt. Never coagulate a crypt at the first treatment. Coagulate around, not into the crypt. After the first treatment the crypts become so widely opened that the danger is lessened.

We can not criticize the enthusiastic salesman for his endeavor to earn his living. The surgeon should be immune from such pitfalls. The year 1929 has taught the medical profession the numerous pitfalls

in this world, by putting too much faith in the too well lubricated tongues of salesmen.

Electrocoagulation of the tonsils is a blessing for many people who are cardiac, nephritic, diabetic, hemophiliac, and for the aged and also those people born with the dread of the knife.

I always tell my patients the operation will take about five to seven treatments. The first few to be given one every week. Then the last two treatments two weeks apart. I let each patient decide for himself whether the operation shall be performed by the surgical method or by electrocoagulation.

Some operators claim that electrocoagulation can be performed during an acute tonsillitis. I agree with Dr. Barlow that electrocoagulation will produce quite a severe reaction in these patients and they might not return for future treatment. I fail to see the advantage of operating when the tonsils are acutely diseased.

I have employed the biactive electrode suggested by Dr. Haiman and believe it is very good for the first three treatments. When you reach the capsule and the pillars, it is rather clumsy.

Dr. Dillinger speaks of a pus membrane. I think the membrane he refers to is a coagulated debris of tonsil tissue, a mechanically produced debris and not an infected debris. Dr. Balmer termed it a coagulum. That is probably the best term for it. In going around the circumference of the tonsil not only do you eliminate danger of hemorrhage but you are cutting off the blood supply from the remaining part of the structure.

Dr. A. S. V. Giglio (Elizabeth, New Jersey): We all agree that electrocoagulation has a place in medicine and is going to remain there. For those few people in the profession who do not believe in electrocoagulation, I am of the opinion that we should leave them alone because it is a waste of time to try to convince them of the merits of the method.

Dr. Strauss remarked that electrocoagulation is a good substitution for bad surgery. I disagree in that. If one does bad surgery in a throat he is likely to do worse with electrocoagulation.

The last speaker spoke on the technique and suggested trying out the machine on all tissues. I think this is a mistake. There is no meat in the throat unless you get into the muscles. If you are going to try the power of the machine use tonsils removed by surgical operation.

I have discarded the foot switch for starting and cutting off the current. I use, on the active electrode, a handle that looks like an automatic pistol. It has a piston which makes and breaks your current and does away with the use of your feet.

Dr. Duncan MacPherson (New York): It has been my lot to be in contact with 25 or 30 different men who have been trying electrocoagulation. Among them are some of the really outstanding men in this city. Contrary to what the essayists have brought out, with one exception, they all preferred other methods than electrocoagulation as their choice for tonsillectomy.

It is reasonable to assume that a certain percentage of cases requiring tonsillectomy are better handled by electrocoagulation. However, it is unreasonable to assume that electrocoagulation has been perfected to the point where it supersedes classical surgical methods for all cases and under all circumstances.

The fact that the majority of specialists have not yet become proficient in electrosurgery is no argument against the procedure. Technic can be mastered, and after more time has elapsed, it will be acquired by every good progressive surgeon engaged in tonsil work.

I am still uncertain regarding the complete removal of all tonsil tissue. In my experience and that of my associates, we are unable to determine when all the tissue has been extirpated. The question of the necessity of complete extirpation cannot be definitely answered. There are too many opinions at present, none of which has been thoroughly substantiated. It is not possible to claim that incomplete removal of tonsil tissue does no particular harm.

Dr. L. L. Doane (Butler, Pennsylvania): I contend that one who attempts electrocoagulation of tonsils should have a thorough basic training in general surgical principles and a specialized training and an adequate experience with the classical surgical methods of tonsil removal. The choice of the method to be employed should be left to the operator, especially so if he is qualified in all the ethical procedures now at our command.

With this thought in mind I shall discuss principally the paper of Dr. Skillern, of Philadelphia, because he represents largely, views not in accord with my own.

This essayist begins and ends his paper with a statement to the effect that electrocoagulation is not to be compared with a clean tonsillectomy, but in the second paragraph he admits that "tonsils can be removed in their entirety by coagulation, leaving as clean a fossa as obtained by any other procedure." This is an important admission and clears the atmosphere for further discussion.

Dr. Skillern admits also that bad lung, heart and goiter cases, also those who have a horror of hospitals, general anesthetics or surgical instruments, are proper subjects for electrocoagulation. Doubtless this list could be materially extended and still have the doctor's approval.

A large proportion of his paper is devoted to a discussion of the quack, the high-pressure salesman, the over-zealous manufacturer and his advertising methods. Here, also, we are in accordance, and I quite agree with the doctor that this work should be limited to those who are properly qualified by training and experience. The same objection might be offered to any method in this or other lines of work.

His suggested remedy, that throat men become skilled in coagulation of tonsils to successfully compete with the incompetent, is timely and reasonable. Again, I agree with Dr. Skillern and others in saying that this work is not easy. I have never, either in my writings or my teachings, maintained that it was, because it is often decidedly difficult.

The doctor says that the man who claims to be able to remove tonsils in the average case without

pain or discomfort is twisting the truth. I could add, "Twisting it so badly it would be hard to find." Ask the patients. Occasionally, one will have neither pain nor soreness, but the average case will have some of both, sometimes quite decidedly. Do not tell them otherwise. In my experience it is extremely rare that one misses a meal from inability to swallow.

Eliminating, then, the classes of cases upon which we are in accord, and that percentage is large but unknown, what is best for the remainder? Dr. Skillern says surgical tonsillectomy. Some say electrocoagulation. The paramount question is that of safety. Under this head would come, first of all, anesthetic, general or locally injected in tonsillectomy, topically applied in coagulation. The danger, probably not one to ten in coagulation. Second, there is primary hemorrhage. Usually it is moderate, may be profuse in tonsillectomy. In coagulation it is hardly possible, not even usual in hemophiliacs. Third, lung abscess or pneumonia following tonsillectomy, unheard of in my experience in coagulation. Fourth, shock may occur from general anesthesia and loss of blood in tonsillectomy, not present in cases under consideration with coagulation. Fifth, mutilation of throat. I saw 38 cases in one year after tonsillectomy; I haven't seen half a dozen cases all told after coagulation. Sixth, secondary hemorrhage, not uncommon after tonsillectomy, may be severe or fatal, rare after coagulation. About one-half of one per cent in my experience. None of these confined to bed or sent to hospital. Seventh, edema. This may occur after coagulation but is extremely rare with proper technique; not expected with tonsillectomy. Eighth, pain and discomfort. Common after tonsillectomy, frequently severe, seldom severe after coagulation, generally moderate, not infrequently entirely absent.

As to time, from several days' loss to a week or more with tonsillectomy; none after coagulation except at the office.

This, although really a surgical procedure, should be looked upon as a course of treatment. The dread of treatment that the doctor speaks of I believe is overemphasized. It is not supposed to be an enjoyable process. I did not enjoy it when I went to my friend Dr. Dillinger for this work several years ago, but I did not dread it, and scarcely thought of it 'till I arrived at the office.

In most cases the dread is before the first treatment. I could illustrate that but I haven't the time.

Expense, this probably does not differ materially in the two methods. Generally there is a fixed price in coagulation but a hospital bill mounts up rapidly. Dr. Skillern says that there is a small, boggy type of tonsil with which one is in for an edematous sore throat. That has not been my experience. I am sure that the fibrous type is more sensitive to coagulation and I generally expect more soreness in these cases, but exceptions are not infrequent both ways. The gagger will complain more of this than of pain.

Whether coagulation is the most difficult and dangerous operation for the inexperienced, as the doctor says, may or may not be the case. At any rate, the inexperienced should not remove tonsils by any method. I have already emphasized that one doing coagulation should have a background of both surgical and electrotherapeutic experience.

After 40 years of experience with electricity in medicine, 25 in surgery of tonsils and 10½ in electrocoagulation, I have this to say, I prefer electrocoagulation in practically all cases. The debatable cases are young children (and these should not generally be removed), the young adult with extremely large tonsils, of a nervous type, bleeders and perhaps other special cases.

I am much in accord with Dr. Dillinger's views. His method requires a treatment with a trained assistant; mine only occasionally, as I generally prefer to hold the pillar-retractor myself. This instrument becomes the indifferent electrode, being attached to one terminal of the high frequency machine. Thus the two terminals are near together. It is under my control while the patient holds the tongue. The current traverses practically only the tonsil tissue. The resistance is low, the current mild, the coagulation instantaneous, the time of each application very short.

In giving directions for technique, Dr. Dillinger says 2800 milliamperes on dead short of terminals is the right strength current. That is correct only for certain types of machines; for others it would be decidedly wrong. With one machine I have in my office that strength current for two to three seconds would be disastrous to a person's throat. Each individual machine should be tested carefully on meat before using it on a patient.

Dr. F. L. Wahrer (Marshalltown, Iowa): I agree with those essayists who have expressed the opinion that electrocoagulation of tonsils is not altogether suitable as a routine procedure. I do believe, however, that there are definite indications for electrocoagulation, but these indications must be left largely to the judgment of the operator. The economic and the psychological factors must be entertained and probably more so than what has been emphasized by most authors.

Frankly, I have not found electrocoagulation the fearful and dangerous operation that Dr. Skillern describes. However, I am wondering if Dr. Skillern did not have a motive for that statement. Is it not a fact Dr. Skillern that you are trying to keep down a little undue enthusiasm on the part of certain men unqualified to do either electrocoagulation or any other type of throat surgery?

The subject of edema has come up several times. I am not convinced that edema is due to any particular type of tonsil, whether it be small and fibrous or of a soft, mushy type. The edema which resulting from electrocoagulation is due to a break in technique in which the operator has brought his coagulating forces too close to the soft palate or the pillars. If the pillars are well retracted from the field of operation, which should be limited absolutely to the tonsil itself, very little edema occurs following coagulation treatment.

Dr. G. L. Morison (West Virginia): Sometime ago I read an article by Dr. Skillern in which he stated that he had removed part of the tonsil by electrocoagulation and then removed the balance

of it by surgery. The purpose of this was a laboratory analysis.

I would like to have Dr. Skillern tell us what the findings were. There seemed to be some controversy whether the pieces left in were infected or not.

Dr. David H. Jones (New York): I am connected with the largest hospital in New York City, where during the last three and a quarter years 30,000 tonsillectomies have been performed. It is only natural that we should be interested in any of the newer procedures which appear to have some merit. One of our men was assigned the problem of investigating the electrocoagulation method and up to the present time 150 cases have been performed. I have observed practically every patient and have yet to see one where the enucleation was as thorough as by surgery.

Dr. J. E. Loftus (Philadelphia): In my experience pain always results from electrocoagulation no matter how careful you are. It is minimized by staying away from the structures within the environs of the tonsil itself.

As Dr. Dillinger has mentioned, it is better in your preliminary treatment to do the least amount possible so that apprehension will be absent in succeeding visits.

There is no reason why every vestige of tonsillar tissue cannot be removed. There are tricks in all trades and when I am in doubt as to the presence of any tonsillar tissue I purposely cause my patient to gag. In so doing the isthmus of the pharynx is prominently exposed bringing into view any remaining tonsillar tissue. The removal of all tonsil tissue is dependent upon good exposure of the tonsillar fossa.

It is my opinion that electrocoagulation will never replace orthodox surgical treatment. In spite of this, however, its sphere in laryngology is now quite definite and distinct.

Dr. Randolph Raynolds (New York): One phase of this subject which I had most hoped to hear discussed this afternoon has been very little touched on. I feel somewhat as I would if I had gone to a symposium on fractures and the afternoon had been spent discussing the surgical results, neglecting entirely the functional.

I wish that some of the essayists, in their closing discussions, would give me some idea as to the relative functional results between surgical and diathermic removal of tonsils.

Dr. W. A. Gross (Chicago): I am delighted to have the opportunity to discuss the important paper of Dr. Skillern. As I have had the pleasure of reading the paper which Dr. Skillern read before the Virginia Laryngological Society in 1928, I am rather surprised that he does not appear quite so enthusiastic now on the subject of electrocoagulation of tonsils.

The paper read at that time coincides almost entirely with my own viewpoint on practically everything that was said. I might add, that where I was formerly, bitterly opposed to the use of diathermy in tonsillectomy, I have become more and more enthusiastic with the possibilities of electrocoagulation. This enthusiasm has increased along with the improvement in my technic.

Dr. Skillern places great stress upon the difficulties of mastering the technic. This cannot be over-emphasized. Personally, I know of several very able laryngologists who are competent surgeons but they do not make much progress with electrocoagulation of tonsils.

The laryngologist, while he is best fitted for this work, is not necessarily the only one who can become proficient. I agree with Dr. Skillern that it requires a great deal of special training. Likewise, it is also admitted that many are doing excellent work with diathermy. Constructive criticism is invaluable from the standpoint of improving technic.

The popularity of this method is increasing rapidly from the layman's viewpoint. It cannot be denied that the layman is greatly impressed. Why? I believe the answer lies in the poor results attending the promiscuous removal of tonsils by those who are unskilled in this work. Nearly every individual knows of unsatisfactory results following a tonsil operation and particularly when performed by one who looks upon it as "only a minor operation," as is so often the case.

No method is 100 per cent correct or perfect. Our results in surgery also depend entirely upon our skill as operators. Occasionally what appeared to be a perfect tonsillectomy at the time of operation is slightly disappointing six or eight weeks later on account of a peculiar scar formation. True, it is not a common result, but, it does occasionally happen. The same results have been observed in cases operated upon by some of our most eminent men in this work.

By no means have I abandoned surgical tonsillectomy. However, I believe in the future electrocoagulation will become, if not actually the "method of choice," at least a very common method of tonsil removal for adults, because of the layman's attitude. At present writing I will admit it is by far the method of choice for the removal of scar tissue and tonsil tabs resulting from improper surgery. Some of the patients in this latter class have been extremely grateful for relief from the annoyance suffered.

At the Illinois Eye and Ear Infirmary, where I originally started the work, there has always been more than an ample number of patients suffering from focal tonsil infections. Results in these cases have been outstanding and here again I feel that it is the method of choice. After all very little new has been added. The cardinal principles are the same as in 1928 when Dr. Skillern treated the subject so ably in his paper. What has transpired since consists more or less of repetition.

My own technic was described in detail in an article first published in the Medical Journal and Record, issue of March 2, 1932. I have been fortunate in that in the cases I have done in the past eighteen months, only a small percentage complain of pain and in most of these there is

only occasional complaint. They, of course, include the well known neurotic type.

By this method treatments seldom require more than fifteen minutes. The coagulated tissue sloughs away in flakes and there is no odor to the breath. No assistant is necessary. Pain is quite insignificant. I recently asked several patients if they looked forward to the treatments with any degree of displeasure. They all replied "No" and some of them said, if so, they would not have returned or would have their tonsils removed surgically. They all require eight or more treatments. The only serious objection I find is the time factor, which may possibly be overcome in the future. The time element received the least consideration. It was sacrificed to achieve safety, a good end result and freedom from pain. Any technic calling for more rapid destruction of tissue must necessarily cause more reaction, pain, danger of hemorrhage and other complications. Those patients who object to the time element may be advised to have a surgical removal.

Electrocoagulation I consider the method of choice in:

1. Focal infections: Where the tonsil is the focus of infection in rheumatism, neuritis, iritis, etc.
2. Bleeders: True hemophilia or those with a tendency to bleed.
3. Tonsil tabs and scars: Usually the result of previous operative attempts.
4. In tuberculosis, goitre, syphilis, and some heart lesions.
5. The aged.
6. Where economic conditions make avoidance of hospitalization necessary and where loss by incapacitation is to be avoided.
7. Professional singers and public speakers.
8. In diphtheria carriers, after Trench Mouth or Vincent's Angina infection, after streptococcus infection and in carriers of other diseases.
9. Patients who from fear or other reasons refuse surgery.
10. Those who desire a partial removal of an eradication of infected parts. A few diathermy treatments practically sterilizes the remaining tissue. Why should every tonsil be completely eradicated when these treatments can be available at any time for the sterilizing effects?

For the past year I have devoted some time to teaching the uses of diathermy in the nose and throat to those medical men who appeared to be competent to take up the work. Those who are interested in the subject are often at a great disadvantage in this respect as teaching facilities are not always available.

Laryngologists in particular from many different sections of the country are becoming interested. It is necessary that they have as much training as possible, that they may become qualified at least in the primary principles.

The conclusions as drawn by Dr. Skillern meet with my hearty approval with the exception that I would modify his statement as to the "operation of necessity." I believe electrocoagulation of tonsils to be actually the operation of choice in quite a large percentage of cases, namely: the types of cases referred to in the classification. In children I use it only rarely, and then only for its sterilizing effects as a preliminary measure to surgical intervention in certain cases.

Dr. Frederick B. Balmer (closing discussion): Despite opinions to the contrary, I still maintain that 95 per cent of all tonsils can be removed very satisfactorily by the surgical method. However, I also maintain that there are certain conditions we cannot control and despite the greatest skill that I can command unsatisfactory results do occur which may be cared for or avoided by the employment of electrosurgery.

It is ideal for the complications following poorly executed surgical tonsillectomy and for that condition alone it justifies a place in the aramentarium of every capable and conscientious surgeon.

Dr. Dillinger says it is best to apply the indifferent electrode directly to the skin. I have gotten away from that by having the indifferent electrode placed under the leather in the cushion of my hydraulic chair, which avoids surface fulguration or arcing as well as the nuisance of discommoding the patient.

I trust that this section will go on record as being intolerant to anything that brings abuse or discredit to this newer adjunct to classical surgery

As far as anyone knowing exactly whether all of that tonsil has been removed or not, I am not so sure that this is a simple matter to judge. Several of my colleagues have been fooled by examing a pharynx without retracting the pillars. They said the job was well done and were amazed when I showed them the tissue behind the anterior pillars.

When I see a tonsil deeply imbedded in the palatal fossa it is a man-sized job to remove it. By local tonsillectomy it can be enucleated without much difficulty; by electrocoagulation considerable difficulty is encountered even by an expert. There is always some question as to whether or not the entire tonsil is removed.

I also prefaced my remarks by saying that I have advocated for years that every vestige of tonsil tissue should be removed, especially when surgery is employed because the connective tissue contracts and buries tonsil tissue which usually becomes an active force of infection. We know from our facial work that we have very little scar tissue from coagulation if it is correctly performed, therefore the conditions are not identical.

There are numerous contraindications. These must be decided upon by the surgeon. It is of prime importance that the patient be co-operative. Sometimes this is not the case but can be made so by careful instruction and encouragement.

So far as the technique is concerned, I want to call to your attention to my combination nonconductive tongue depressor and pillar retractor. With it I can, without an assistant, bring the fundus into view. If you want to see whether the tonsils are out, pull back the pillar, and grasp the tonsil. It is always possible that a portion

of the tonsil might be left and caution must be exercised when a final inspection is made. My level electrode needles and holder you are well acquainted with.

I think it is up to the doctor to have the confidence of his patients and psychological control of them.

I have made and used the biactive electrode some yeasr ago but believe that the monoactive electrode is better. I have already mentioned the arrangement of the indifferent ground electrode having it under the chair seat. The patient does not see it and there are no explanations to be made. The treatment, as I give it, lasts five minutes.

I am very anxious to have the good will of my colleagues and I do not desire to continue this work if perpetual antagonism is in store. I shall always try to reason the thing out with them, if they are reasonable and understanding. I am sure that much can be accomplished by a scientific exchange of thought. Only in this way can we eventually decide on the value of this or any other new method of removing tonsils.

Dr. Samuel R. Skillern (closing discussion): It is true that my paper was aimed essentially at the enthusiasm of the unqualified operator. I do not know how it is in other cities, but in Philadelphia the equipment salesmen have abused their rights and those of regular physicians by attempting to sell a machine to any cult or quack who was willing to purchase it and set up in the tonsil work. This is one of the reasons why I believe that overenthusiasm must be checked. Too much is promised without regard for the truth. Men are undertaking the procedure with little or no experience.

I will now answer some of the questions that have been put to me. I have used every anesthetic that has been suggested, and I have even gone back to the old menthol-cocain-phenol-crystal combination. None of these anesthetics make it possible to do a painless operation.

Few of my patients really miss a meal. The throat is sore but not sufficiently so as to interfere with eating. The soreness is annoying enough to keep a patient awake. I call that pain. Anything that keeps me awake and that hurts me I call pain.

The amount of pain depends a great deal on the patient. I removed one pair of tonsils, from a trained singer's throat by the LaForce method under avertin. I am using that nearly altogether now. That patient woke up about three hours later. As a rule I always go back to the hospital before I go home at night. He was sitting on the side of his bed eating a cold roast beef sandwich. I do not think you can do much better than that with electrocoagulation.

As to the time consumed with a LaForce operation, most of the boys in our clinic can take out a pair of tonsils in less than 10 minutes and leave a bloodless field. If they get any blood it is because they have slipped up in the technique. I can take them out bloodlessly if I am very, very careful. If I am a little bit sloppy in my work there is a little bleeding. We never get bleeding that requires the putting in of more than a stitch. The most that we ever put in was a ligature, and usually it is just a sponge that is left in the fossa for a brief period. Therefore, the hemorrhage from a general anesthesia with us is practically nil.

I can honestly say that I haven't gone back to the hospital for post-operative hemorrhage following a LaForce tonsillectomy, for ten years. I have had two hemorrhages in my private practice, both of them within one week after the operation. They were both little venous oozings.

As to the time consumed, I just said that I can take out five pairs of tonsils while I am coagulating two. The shock from general anesthesia — there is none. In avertin they go to sleep in their beds and they wake up in the same place. They go down asleep and come up the same way. They wake up and say, "When are you going to operate on me?" They do not have any pain in the throat. The avertin kills the sensory nerve filaments and they usually wake up and ask for a glass of water. The next day they are fairly comfortable.

There should be no mutilation of a throat if a tonsil is removed properly. The anterior and posterior pillars should be intact.

I took out five sets of tonsils, coagulating one side and surgically removing the other. Every patient subjected to this experiment told me that the coagulated side hurt more afterwards than the operated side. I do not mean the first coagulation, but I mean about the third coagulation. I gave the treatments fairly heavy.

Dr. Morison spoke of the examination of the tonsils after electrocoagulation. I took out five sets of tonsils, starting with the very first coagulation and running up to the sixth and in all of those tonsils, with one excetpion, we were able to grow organisms. I tried to take as many precautions as possible. Of course, there may have been some contamination from the mouth, but as soon as we took the tonsils out we seared the surface and sent them right to the laboratory. The tonsil was then split.

My own objection to not taking out all of the tonsillar tissue is that we do not know if we have even the base of all the crypts. If the crypt was a perfectly straight tube running up and down in the tonsil, all well and good. But, the crypts may go down and across, and up, over and down again, in any old direction at all. We never know how these crypts run. It is generally in the end of those crypts that infection is confined. It is the confined infection that does the damage, and not the infection that is present in the throat.

Why is it that the little submerged tonsils cause more trouble than the other types? Every time one swallows he wipes off the swollen tonsil while the other gets nothing done to it.

Dr. Gregg A. Dillinger (closing discussion): I am sorry that some of us did not touch on the question raised by our friend as to the results of

tonsillectomy by coagulation. That wasn't in my part of the program.

I am here to say that coagulation of tonsils will eventually be the routine operation. The family doctor and his patient are going to force this condition.

Some New York specialists are now using coagulation. I doubt whether this is by choice. I rather think it is because they have been forced into it by the demands of their patients.

Regarding the time necessary for a coagulation treatment, permit me to say that my average time is three minutes. This certainly compares favorably with the average time of tonsillectomy as mentioned by Dr. Skillern.

The advantage of electrocoagulation over the surgical procedure is that while we are treating we are having the patient come every week. I treat both tonsils at one sitting for patients coming to me from a distance. Then they do not have to return for three weeks. I never treat a throat until the area previously treated has healed.

There is no severe reaction even in tuberculosis and in cardiac patients. The patient is not upset, and aside from a slight nervousness, which is characteristic of many people when they visit a doctor, there is no complaint.

Dr. Edgar R. Maillard (closing discussion): I do not have much to add to what has already been said, but I do agree with Dr. Dillinger. My limited experience has been that the patient very often is much more afraid of the first treatment than of the subsequent treatments.

I have never had a hemorrhage in my experience. I do not know whether I have been fortunate or not. I do not think that both sides of the tonsil should be treated at the same time. The inconvenience and the embarrassment is too great.

A consideration that has been overlooked is the question of infection in the tonsil. Most of the possible operative bad effects, I believe, are due to the inflammation present in the tonsil rather than to the type of tonsil, except that you may have a tonsil where the crypts may be sealed and the infection enclosed within. Whether it is a large or small tonsil, or a fibrous one does not make as much difference as the inflammatory condition of the tonsil, at the time of coagulation.

THE EFFECT OF ULTRAVIOLET LIGHT IN SO-CALLED NEURALGIAS * **

DISRAELI KOBAK, M.D., and ESTHER FRANKEL, M.D.

CHICAGO

There is a rather large group of patients in whom the x-ray shows few if any changes to account for the presence of acute shoulder pains. A careful examination of the involved area reveals marked pressure pain of the so-called nerve points where the nerves are nearest the surface, so that the pressure is easily transferred to the nerve.

The nerve points in question are:

1. Erb's point, 1 cm. above the middle of the clavicular region where the brachioplexus is next the surface.
2. Axilla, with the axillar plexus imbedded in the lymphatic tissue.
3. Ulnar sulcus, between the olecranon and the head of the ulna.
4. In thin patients, along the course of the nerve trunks wherein pressure pain can be detected.

A typical symptom in all these cases is increased pain at night in the region of the affected arm or shoulder muscles. Occupational influences appear to be an important factor. The symptoms occur frequently in musicians and drivers and is located in the shoulder belt region as a *locus minoris resistentiae*, due not only to the physical strain, but also to a nerve tension effort concentrated on that particular part. One should also include as a causative factor inflammatory exudates producing pressure on local nerve branches.

There appears to be some predisposition to the neuralgic symptoms in women during pregnancy, the climateric, and at the time of the menstrual periods. The above complex of symptoms may be referred to as "so-called" brachial neuralgi. This is often also an associated condition of shoulder or arm injuries, and of arthritis or bursitis.

We wish to report at this time only the

* Read at the Eleventh Annual Session of the American Congress of Physical Therapy, New York, September 6, 1932.

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results of a study of 141 cases of so-called brachial neuralgia treated since 1927 in the college dispensary. The patients were all referred from other departments. Pressure upon involved nerves and predisposing foci of infection were definitely considered and excluded. The treatment employed in all these cases was ultraviolet radiation, according to the method accepted in the international literature, namely, *Erythema Dose*.

Of the 141 cases treated, 58 did not report for further observation and, hence, there was no way to determine the results of the treatments. Of the 83 cases which we were able to follow up, 51 have been discharged as cured, 21 were greatly improved, 7 were slightly improved, 4 were not improved. In other words, 66 per cent were permanently cured, 25 per cent were considerably improved, 8.5 per cent were slightly improved, and not quite 5 per cent did not respond to the treatment.

Technic and Theory of Action

The term *Erythema Dose* signifies an eight-minute radiation at approximately 100 cm. distance. This is a unit for the initial dose which should be increased gradually according to the increasing resistance of the skin resulting from pigmentation. The individual reaction of the skin varies and is determined by a trial radiation. When the general condition warranted, the local treatment was supplemented with general ultraviolet radiation because of its tonic and supportive values. Air-cooled mercury in quartz lamps were used. These were periodically tested as to their degree of radiation intensity by a Chicago representative of the Hanovia Chemical and Manufacturing Company.

Regarding the question, "In what way does ultraviolet radiation influence the neuralgic conditions?" The explanation is to be found in the changes associated with the erythema of the skin which are, according to the experiments of Keller,[1] mainly a destruction of the prickle cells with active changes in the blood vessels such as dilatation, exudation and emigration of leucocytes. The foregoing reaction is considered as analogous to the parenteral protein incorporation which may follow either the process of albumen decomposition in the liver or be the result of transmineralization — a form of physical change in the state of body colloids, according to Matthes.[2] These theories should be considered in connection with the fact that the above mentionel changes are intradermal ones where the nerve ends are imbedded. The experiments of Petersen and Oetingen show that the skin and vagus part of the visceral nervous system are specifically related to each other, and changes in the blood distribution may result following the ultraviolet radiation of the skin.

An increase of the metabolism of the blood cells, according to Ziegler,[4] and Weichhardt,[5] may also play a part in the reaction. Experiments of these authors establish the fact that the action of ultraviolet light is not only a direct light reaction, but mainly a result of compound relations between the inflamed skin and the whole organism.

Case Reports

Three cases representative of the series are reported:

Case I. Mr. C. Age 35, single; traveling salesman. Excruciating pain in left shoulder and arm following an attack of flu. General examination negative. Marked tenderness at Erb's point and also along the course of the large nerve trunks. No foci of infection. X-ray negative. Ultraviolet irradiations followed by erythema of the involved area cleared up the condition in three treatments.

Case II. Mrs. H., 45 years old; employee of Presbyterian Hospital. Sharp pain in left shoulder and arm. Onset sudden with no apparent etiology. General examination negative. No objective changes. Marked tenderness at Erb's point. Ultraviolet irradiations for a considerable time did not improve the condition which later x-ray revealed as a definite cervical rib.

Case III. Mr. M., 48 years old; unemployed. Pain in left shoulder and arm which is worse at night. General examination is negative except for a lipoma at the back of the neck. Marked tenderness at the Erb's point, in the axilla, and along the course of the nerve trunks. Five ultraviolet irradiations followed by erythema of the involved area produced a favorable result.

Conclusions

Clinical studies during the past five years lead us to the conclusion that ultraviolet irradiation provoking a sharp, local erythema, definitely produces an amelioration of symptoms in so-called cervicobrachial neuralgias. Checked by controls in which similar conditions were treated with recognized medication, the results obtained by means of local ultraviolet irradiation were demonstrated to offer satisfactory and at times permanent relief. In addition, the simplicity of technic utilized in these instances is such that any physician with an ordinary background in

ultraviolet procedure can secure results similar to those obtained in our series.

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Discussion

Dr. Richard Kovács (New York): The report on the beneficial effect of any form of physical therapy on a given pathological or functional condition must be accompanied by an acceptable explanation of its primary physical and its secondary physiological effects, so that there may be an intelligent understanding of its mode of action instead of crude statements as to empirical results. How can ultraviolet irradiation benefit brachial neuralgias or any other form of neuralgia or myositis as has been reported in the literature? It has been stated by recent investigators such as Eidenow, Turrell and others that the effect of short ultraviolet rays on the skin produces results similar to an injection of protein or organic substances. The erythema causes dilatation of the capallaries with increased absorption into the body of the products of irradiation, foremost of which is an amine substance known as histamine, which acts like a foreign protein shock.

The erythema or mild dermatitis caused by ultraviolet, furthermore, acts as a counterirritant. Such irritations of the skin by mustard, hot irons, vesicants have been employed with more or less success for ages. The short waves of ultraviolet enable the production of such effects with a more definite dosage and a better understanding of the working mechanism of such skin irritation. Ruhman produced a hyperaemia of the abdominal organs by a variety of mechanical, thermal and chemical effects on the skin. Brown-Sequard observed many years ago that following extensive burns there appeared a hyperaemia of inner organs. It is now generally accepted that skin irritants act on the vegetative nervous system and the functions under its influence by a reflex arc which leads from the sensory and sympathetic fibers of the skin to the spinal cord and there is shunted over through the sympathicus to inner organs. Painful phenomena of the skin in connection with affections of inner organs have been likewise explained by the knowledge of Head's zones.

In treating neuralgias of various kinds, I have always found that the addition of high frequency condenser treatment from the single high voltage terminal of the high frequency apparatus notably enhances the pain-relieving effect. This can be now explained on a similar basis as the effects of ultraviolet in neuralgias. Diathermy only exerts a beneficial heat effect, but the mild sparking from the vacuum or non-vacuum electrode exerts a skin irritation of varying degree and if desired even a marked erythema or blistering, thus reproducing almost the effects of short wave ultraviolet irradiation. It is a question of therapeutic expediency whether to apply counterirritation through ultraviolet irradiation or through the more flexible method of monoterminal high frequency condenser discharges.

In closing I would like to point out that the paper just stated generally the study of cases and erythema dose treatment but did not mention how many treatments were given on the average nor the frequency of these treatments. Everybody who wishes to reproduce the results stated by the authors no doubt desires more definite data.

Dr. H. M. F. Behneman (San Francisco, Cal.): The term brachial neuralgia is, in my mind, analogous to the condition known as radiculitis or nerve root pathology. In a moderately large series of cases, I have learned to change certain views held for a long time. My first choice in the therapeusis of nerve root involvement had been diathermy. I found, however, that the inflammatory reaction of the first one or few treatments was often so troubling to the patient that their cooperation toward further therapy was difficult to obtain, because they felt they had a slight increase in their pain or that the delay in recovery was too great I used diathermy over the spine in the area ot involvement, because I felt that the inflamed sheaths surrounding these nerve roots needed deep heat for further drainage. I finally realized that speed of recovery was not fast enough and turned to infrared for greater cutaneous circulation and drainage. The results were more satisfactory, but I was aware of the fact that this was purely a rather local attack on an inflamed area without much being done in the way of elimination of etiology, except the routine search for foci of infection. What was needed was more increased general resistance against the causative factor, known or unknown. Finally, then, I, too, started using ultraviolet locally, as Drs. Frankel and Kobak have done, and at the same time applying whole body irradiation. I was quickly and firmly convinced of the wisdom and efficacy of this therapy. My feeling is that the excellent results herein reported by the authors are due more to the general chemical and glandular changes, some of which we know very little about, which produce the resistance to the infection or the inflammation, rather than to the local erythema or counterirritant effect. We all know the difficulty at times of determining the etiology of these puzzling, so-called, neurites. Foci of infection can't always be found and when the etiology is unknown, ultraviolet radiation, as any other agent, is not up against a fair test of value.

I would like to mention what experience has taught me to beware of in these cases, and that is

chiefly in posture. Sometimes it is faulty occupational posture, as the authors have mentioned, but often it is nocturnal faulty posture occurring during sleep. Many patients have been speedily improved by harder mattresses or elimination of pillows of too firm consistency. I consider that complete rest of the part affected is most essential with this of ultraviolet therapy to promote prompt recovery.

Along with the ultraviolet irradiation of the arm and shoulder, I insist that patients use heat, either in the form of a hot water bag or an electric pad between the shoulder blades when in bed and to try to sleep on their backs without pillows. With these factors attended to and the other routine factors concerning etiology, the full opportunity of ultraviolet to effect the recovery, which it rarely fails to do, is not in any way hindered.

Dr. Esther Frankel (Chicago), closing discussion: I would like to answer Dr. Kovács' question as to the number of treatments and their frequency. It varies in individuals between one to approximately twenty. As regards the frequency, this also is an individual problem. The rule in ultraviolet therapy is to wait until the previous reaction has subsided. Generally it is necessary to wait longer after the very first treatment because the skin is then more sensitive. We ahve made a rule that if the patient does not favorably respond after the first few treatments, we do not generally expect complete relief. This observation is based upon experience and may perhaps be explained on factors mentioned by Brown-Sequard to which Dr. Kovács called attention, or upon the pressor-depressor law of reflex arc theory in physiology.

I wish to corroborate the observation made by Dr. Behneman as regards the combination of light treatment with heat. We found that heat, especially penetrating heat, (Diathermy) in acute neuralgic pain, greatly aggravated the condition and interfered with our good results.

Dr. Disraeli Kobak (Chicago), closing discussion: Discussions are frequently more enlightening than the paper itself, and in this instance the questions raised and the confirmation added to it have rounded out this preliminary report to a satisfactory degree. Dr. Kovács' critical mind noted the Achilles ankle of the paper — its generalization in regard to the average number of treatments and the frequency of these treatments. It was taken for granted that this particular group specializing in physical therapy would be cognizant that von Grotthus' law is here as in other treatments effectively obeyed; namely, that only such radiation as is absorbed can produce photochemical effects. The introduction of intensive ultraviolet radiation produces physico-chemical changes and certain local reactions which often verge on a relatively mild vesication effect, followed by a furry-like parchment desquamation and pigmentation. Any ultraviolet radiation given in the interval between erythema and desquamation is ineffective to a large degree, because of the barrier set up by the scaly and shedding skin. One must wait until that portion of the skin is restored to normal or employ fractional irradiation and treat another area during the interval of restitution.

I need not emphasize further the theory and technic employed. It holds true here as it does in treatment of other local conditions. Dr. Frankel prefers to employ the continental dosage of the 100 centimeter distance for 8 minutes. This has never been fully acceptable to me because I cannot conceive of a hard and fast rule applicable to all mercury quartz ultraviolet burners. A more practical measure of dosage for all lamps would be an erythema dose at a certain standard distance in which the individual lamp would be tested for the individual's reaction by employing the instrument with multiple appertures first introduced in America by the speaker. The instrument contains a series of 8-10 small openings through which the ultraviolet passes and is then individually screened off after a stated period, usually from 2-10 minutes. It resembles the French instrument of Saidman and has been manufactured by the Burdick and General Electric Companies for many years. It is convenient, cheap and practical for any lamp at any age of its life.

Dr. Kovács' discussion has been so meaty that time will only permit me to touch another point raised by him. While it is true that the condenser electrode is efficient for its counterirritating and rubifacient qualities, it is strikingly inferior to ultraviolet radiation. I have compared its value and unhesitatingly speak for the superiority of ultraviolet. The effect of the condenser electrode treatment is temporary. It is tiring to the operator and disquieting to the patient. Local ultraviolet, on the other hand, has all the virtues hoped for in the former and is seldom used without relief — temporary or permanent. It is superior to infrared, although the latter has greater virtues than diathermy in the acute state of the disease. Diathermy is effective only when used in mildest and shortest application, otherwise it will provoke deep seated pain in the treated part.

I do not wish to leave the impression that ultraviolet is a specific in these cases. Its favorable effect suggests that we use it in combination with proven medication, correction of the pathology, and the introduction of such measures as have been so logically advocated by Behneman. Too often the doctor has considered this type of affection either very lightly or treated it very carelessly. The patient has certain perverted ideas that such conditions yield best to manipulation, and when he meets with disappointment, which unfortunately has been most frequently his experience, he succumbs to the lure of quackish practices and becomes a martyr to his affection.

PHYSIOLOGY OF THE MERCURY LINE 254 mu *

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Introduction

Ultraviolet light does not behave as a unit biologically. Various spectral areas cause different biological effects. The longer wave ultraviolet penetrates deeply through tissue, but exhibits little or no biologic action. The shorter wave ultraviolet has practically no penetrating power and causes few biological effects. It is at the borderline between the so-called near and far ultraviolet, that the largest number and most intense biological effects are produced. Therefore this spectral range has been named the region of the "actinic rays." The exact limitation of this area is still rather uncertain. At the long wave end most reactions become evident at about 313 mμ. This holds true for the erythema producing effect, as determined first by Hausser and Vahle,[1] and affirmed recently by Luckiesh, Holladay and Taylor,[2] and by Coblentz, Stair and Hogue.[3] It also holds for the bactericidal effect, although some authors claim that the bactericidal action starts at 350 (Bayne-Jones)[4] or at 365 mμ (Coblentz and Fulton),[5], while others quote lower figures, such as 296 mμ (Browning and Russ)[6] or 280 mμ (Newcomer).[7] The antirachitic effect starts at 313 or at 302 mμ, according to most authors. It appears therefore that the long wave end of the actinic rays is comparatively sharp and well defined.

This is different for the short wave limitation. Here most of the observations contradict one another: While Hasselbalch[8] found no penetration through skin for rays of shorter wavelength than 293 mμ through .1 mm of skin, Macht and his co-workers found for skin of about 1 mm thickness pronounced penetration down to a wavelength of 254 mμ, even with increased figures toward shorter wavelengths. Concerning erythema production Hausser and Vahle first noticed only the activity maximum at 297 mμ; in a later publication they detected the second maximum at 250 mμ.

A great controversy developed about the effect of wavelength in regard to the antirachitic effect. In contrast to the consensus of opinion concerning the vitamin D production by wavelengths from 270 to 300 mμ, it appeared uncertain whether rays of about 260 mμ, and of still shorter wavelengths, produced or destroyed vitamin D. This problem is of great theoretical importance for the short limit determination of the actinic rays, and also of great practical value for the treatment and prevention of rickets and for food activation.

The problem of the actinic effects of the shorter ultraviolet rays became more acute when a new source of ultraviolet light was introduced in the form of the cold quartz light. The introduction of this lamp has also increased the facilities for more accurate research work, inasmuch as it emits a powerful spectral line at 254 mμ, which adapts itself easily to monochromatic study of that wavelength.

In order to investigate all these important unsolved problems I started an extensive research about the biological effects of the wavelength 254 mμ.

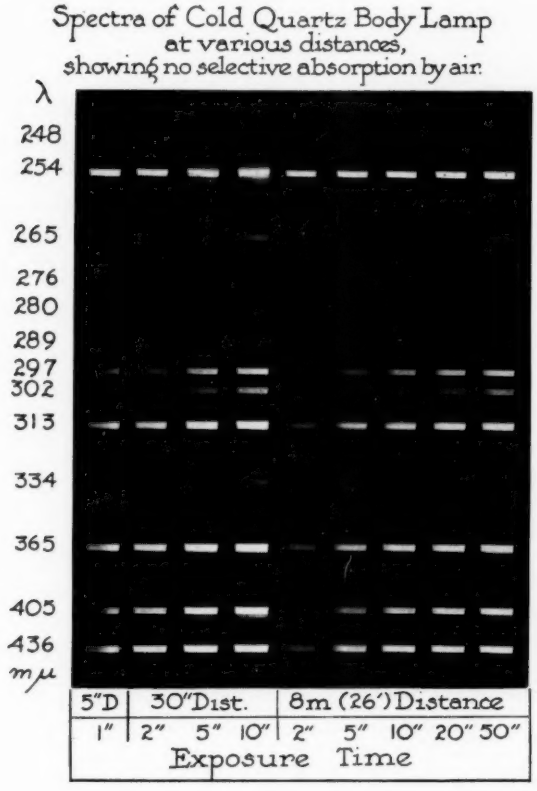
Air Transmission of Ultraviolet

Among physiotherapists the idea prevails that the short wave therapeutic rays are very strongly absorbed by the air of the room. Due to the increased absorption toward shorter rays, any increase of the focus skin distance is supposed to weaken or even to shorten the ultraviolet spectrum at the short wave end.

Unfortunately little is known about the ultraviolet transmission of the atmosphere. The tables of Landolt and Boernstein give the extinction coefficient of air for one wavelength, $\lambda = 186$ mμ, as $\alpha = 0.00194$. From this figure one can calculate that 1 meter of air transmits 77 per cent of the incident energy of that extremely short wavelength. Figures for the extinction of the main constituents of air, i. e., oxygen and nitrogen, indicate that the oxygen absorption is the deciding factor

* Read at the Eleventh Annual Session of the American Congress of Physical Therapy, New York, September 9, 1932.

Fig. 1



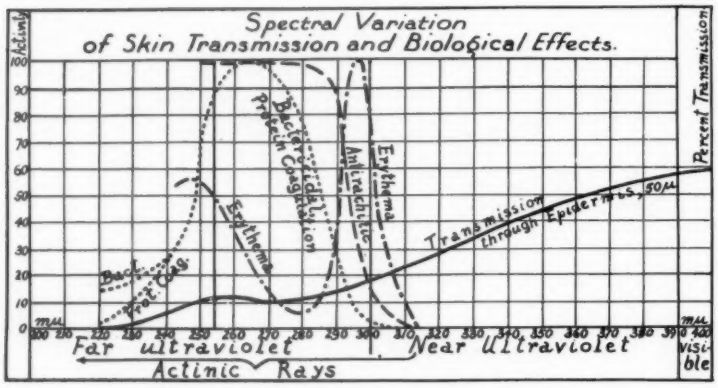
of the air absorption, whereas the nitrogen absorption is negligible. The tables show the oxygen absorption for the two wavelengths 186 and 193 mμ, as ∝ 0.0089 and 0.00149 respectively, which represents a transmission of 13 per cent and 71 per cent, respectively, through 1 meter of air. These figures indicate a great increase of absorption within the short spectral area from 193 toward 186 mμ. At the same time they prove, however, that the air absorption for wavelengths longer than 193 mμ cannot be of much importance. Warburg's oxygen figures for the wavelength 253 mμ are useless for our purposes inasmuch as they are derived from experiments with oxygen at high pressure, for which Beer's law does not hold true, hence not permitting any conclusions for air under ordinary atmospheric pressure.

By a simple experiment one can secure convincing evidence that the air absorption of ultraviolet is negligible in the range of therapeutically used rays extending down to 254 mμ or even shorter wavelengths. The spectrum of the cold quartz body lamp was taken by use of a quartz spectograph, with the lamp at 5 in., 30 in. and 8 m. (26 ft.) from the slit of the apparatus. Exposure times were selected for the three distances to produce nearly identical optical densities of the spectral lines of long wavelengths. From the spectral plates (Fig. 1) it was evident that the spectra were practically identical over the whole range of wavelengths, not showing any decreased intensity in the short-wave region for increased distance. From this we may conclude that the increase of absorption of ultraviolet from 390 to 253 mμ by the atmospheric air is so insignificant as to be of no importance for practical therapeutic work.

Skin-Penetration

I have studied the penetration of ultraviolet light into human skin, partly in joint work with Dr. C. I. Reed, in a number of investigations.[9] Several methods were developed to attack the problem quantitatively. The best quantitative results were obtained by a filter method, described in a previous communication; but the wavelength separation was not good enough in the short wave ultraviolet region. On the other hand, by using the quartz

Fig. 2



spectograph in the routine way, with the skin specimen in front of the slit, the dissolving power in the ultraviolet is very great, but the results are of no quantitative (only comparative) value. In order to get the best possible results, in the region of shorter wavelength, I have, assisted by L. F. Moldavesky, used a quartz monochromator, in connection with filters, to exclude visible and ultraviolet rays which are not required; a plate holder was inserted on the opposite side, with a provision that a skin specimen could be inserted in immediate contact with the photographic plate, and that it could be switched out for the controls. The rest of the work, exposure, development, measurement of the optical density, was the same as in the previous work. For wavelengths of 254 mμ the cold quartz local applicator was used; for the comparative figures 240, 265, 280, 302, 313 mμ the Kromayer lamp was used instead of the cold quartz lamp. The results of our previous work were first of all confirmed, namely: that the transmission decreases gradually toward shorter wavelengths (Fig. 2); that transmission is far greater than suggested by Hasselbalch, but much smaller than claimed by Macht[10] and his co-workers. While we found some evidence of a minimum of transmission at about 270 and an increase at about 250 mμ, we found that the transmission falls off sharply beyond 248 mμ. This places the wavelength 254 mμ definitely into the spectral range of rays which penetrate into the living portions of the skin. Accordingly, we should expect skin reactions, such as erythema and pigmentation in that part of the spectrum.

Erythema

The erythema producing effect as established by Hausser and Vahle, and confirmed more recently, varies with the wavelength of the applied ultraviolet; it is maximal at 300 and 250 mμ, and shows a pronounced minimum at 280 mμ. (Fig. 2.) Hausser and Vahle established two important facts for the two sensitivity areas:

1. The latent period and the reaction time is much shorter for the 250 mμ area than for the one of longer wavelength.

2. The range of the exposure time for producing an erythema without causing blistering is much greater for the short wave maximum than for the one of longer wavelength.

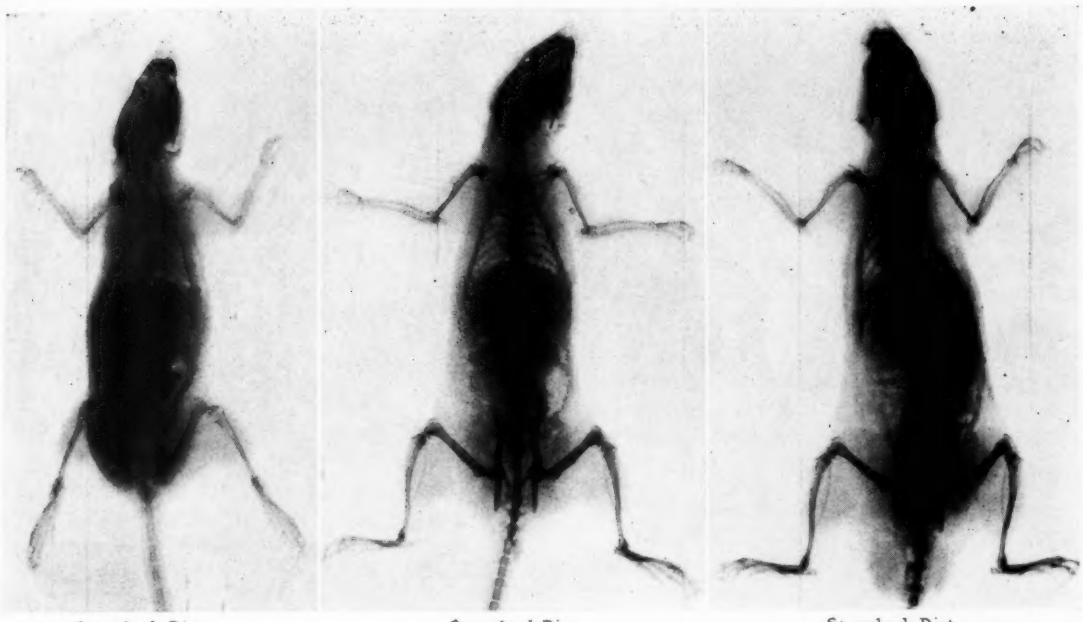
In these two respects the short wave ultraviolet rays are analogous to the long wave x-rays, the *Grenzstrahlen* (or border-line rays), which are utilized for the treatment of very superficial skin diseases, requiring a strong exposure by a radiation that has a limited penetrating power; and which can be repeated with short-time intervals without causing a great cumulative effect.

From the above, I am convinced that the short wave ultraviolet light opens a field of great therapeutic possibilities.

Antirachitic Effect

In order to study the line 254 mμ in regard to its antirachitic effect, I have in collaboration with C. I. Reed conducted several growth experiments with rats. The rats were arranged in groups of 3 or 4 of identical weight, some on Steenbock, some on McCollum diet; one group was kept on normal diet. In two experiments they were exposed to the cold quartz body lamp at 12 inches, to the Battle Creek Sunlamp (incandescent bulb with mer-

Fig. 3



cury) at 15 inches, and to the Hanovia Superalpine at 20 inches distance. The respective intensity figures for those treatment conditions were about 120; 67; 155 x 10^{-4} $\frac{\text{cal}}{\text{cm}^2\text{min.}}$ Of course, the spectral intensity distribution is different for the various lamps; while the Superalpine lamp covers the ultraviolet from about 240 mμ upward, with spectral lines of comparable intensity, the Battle Creek lamp emits a reduced intensity in the short wave limit from about 280 mμ on, and the cold quartz lamp emits about 98 per cent of its ultraviolet radiation below 270 mμ. In the latter case one approaches monochromatic ultraviolet light of the 254 mμ wavelength. The exposure times were 2, 5, and 10 minutes daily. After about six weeks there was nearly complete calcification from 2 minutes of exposure with the Superalpine and the cold quartz lamps; at 5 minutes treatment with these lamps the rats were nearly normal. The results obtained with the Battle Creek Lamp were inferior corresponding to the lower intensity; 5 minutes of that lamp corresponding to about 2 minutes of the other lamps. At 10 minutes exposure the rats were entirely normal. (Fig. 3.)

While in these experiments the ultraviolet irradiation prevented rickets, the animals being on a ricket-producing diet, in another experiment the animals were actually made rachitic by an insufficient diet for 5 weeks, and ultraviolet treatments were started then, in order to cure the rachitic animals. These experiments were conducted only with the cold quartz lamp, with daily exposures of 3, 10, and 20 minutes, for 5 weeks. X-ray photographs show nearly complete calcification at 3 minutes daily exposure, and complete healing at 10 and 20 minutes. The best growth resulted from the 10 minutes exposure.

In order to rule out the possibility that the longer ultraviolet of very low intensity caused the antirachitic effects, I have exposed two rats to the cold quartz lamp through a chlorine-bromine gas filter, which transmits about 50 per cent of 254 mμ, but absorbs practically everything above 280 mμ. Therefore, the transmitted light was of a radiation shorter than 280 mμ. Its intensity was reduced to about 1/6 of the unfiltered light, and a longer exposure, 30 minutes, was required, which compares quantitatively with about 5 minutes exposure to direct cold quartz light. The x-ray evidence demonstrated completely healed

rickets, indicating that the wavelength 254 mμ has pronounced antirachitic effect.

Bactericidal Effect

The bactericidal effect of the various parts of the ultraviolet spectrum is not yet established definitely. Sonne [11] has conducted some experiments along this line, and he found a maximal bactericidal effect at 265 mμ. His bactericidal curve closely coincides with his protein coagulation curve. On the other hand, Gates[12] describes two spectral maxima of bactericidal effect at about 265 mμ and below 230 mμ, with a decreased effect at 240 mμ. He finds a correspondence between the bactericidal effect and the absorption of ultraviolet light by the bacteria, in that there is a slight decrease at 240 mμ.

The experiments, which I started, together with M. A. Dushkin, indicate pronounced bactericidal effects from 302 mμ on toward shorter wavelengths; the bactericidal effect seems to reach a first maximum at about 280 and 265 mμ, declines somewhat toward 248 mμ, and increases again towards 240 mμ and perhaps still shorter wavelengths. These results are not final, however, and need verification.

Fluorescence

It is open to speculation whether some of the biological effects caused by the wavelength 254 mμ may be due to fluorescence, i. e., a secondary radiation of longer wavelength, produced by the absorbed short wave radiation.

In a previous investigation I have shown that fluorescence of skin in the near ultraviolet is not strong enough to affect noticeably our transmission figures. Visual observations on the well purified wavelength 254 mμ could not reveal any noticeable fluorescence.

From these observations it seems doubtful to me that fluorescence plays an important rôle, and we have to consider the biological action as caused directly by the absorption of the shortwave rays.

Air Transmission of Ultraviolet

Among physiotherapists the idea prevails that the short wave therapeutic rays are very strongly absorbed by the air of the room. Due to the increased absorption toward shorter rays, any increase of the focus skin distance is supposed to weaken or even to shorten the ultraviolet spectrum at the short wave end.

Unfortunately little is known about the ultraviolet transmission of the atmosphere. The tables of Landolt and Boernstein give the extinction coefficient of air for one wavelength, $\lambda = 186$ mμ, as $= 0.00194$. From this figure one can calculate that 1 meter of air transmits 77 per cent of the incident energy of that extremely short wavelength. Figures for the extinction of the main constituents of air, i. e., oxygen and nitrogen, indicate that the oxygen absorption is the deciding factor of the air absorption, whereas the nitrogen absorption is negligible. The tables show the oxygen absorption for the two wavelengths 186 and 193 mμ, as $X = 0.0089$ and 0.00149, respectively, which represents a transmission of 13 per cent and 71 per cent, respectively, through 1 m. air. These figures indicate a great increase of absorption within the short spectral area from 193 toward 186 mμ. At the same time they prove, however, that the air absorption for wavelengths longer than 193 mμ cannot be of much importance. Warburg's oxygen figures for the wavelength 253 mμ are useless for our purposes inasmuch as they are derived from experiments with oxygen at high pressure, for which Beer's law does not hold true; hence not permitting any conclusions for air under ordinary atmospheric pressure.

By a simple experiment one can secure convincing evidence that the air absorption of ultraviolet is negligible in the range of therapeutically used rays extending down to 253 mμ or even shorter wavelengths. The spectrum of the cold quartz grid lamp was taken by use of a quartz spectograph, with the lamp at 5 in., 30 in. and 8 m. (26 ft.) from the slit of the apparatus. Exposure times were selected for the three distances to produce nearly identical optical densities of the spectral lines of long wavelengths. From the spectral plates it was evident that the spectra were practically identical over the whole range of wavelengths, not showing any decreased intensity in the short wave region for increased distance. From this we may conclude that the increase of absorption of ultraviolet from 390 mμ to 253 mμ by the atmospheric air is so insignificant as to be of no importance for practical therapeutic work.

Conclusions

From the various physical and biological effects observed we can state that the wavelength 254mμ has enough penetrating power to produce biological effects; that it causes an

erythema, with little danger of overexposure and accumulation; that it has a positive antirachitic effect; i. e., it produces vitamin D and does not destroy it, so long as excessive irradiation is avoided; hence there is no antagonistic effect between this and the longer actinic rays. In regard to the bactericidal effect it does not differ from rays of longer or shorter wavelength. In all these respects the wavelength 254 mμ must be considered as having normal actinic properties, which make it useful for therapeutic purposes.

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LIGHT THERAPY ON A BIOLOGICAL BASIS

(A suggestion for its application)

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NEW YORK

Since language was invented the human race has become a slave to its intricacies. Instead of taking words as symbols we have become accustomed to look at them as entities. The old fight between nominalists and realists is still going on, and medical science and its progress have been greatly retarded by this uncertainty which all the conferences dealing with medical nomenclature will not abolish.

It is only necessary to mention an expression such as rheumatism to make clear how the ignorance of past ages still holds us in its grip. *Rheumatismos* meant the liability to rheuma, a humor or flux. Even the Century Dictionary says that the word is used with a certain unfortunate freedom in application to joint pain of various origin and anatomical forms.

In the practical application of light therapy the haphazard use of words like ultraviolet rays threatens to prevent a scientific application of this method. With the expression ultraviolet rays all those electro-magnetic waves are meant which stretch beyond the violet end of the spectrum. It is true that all those waves which lie beyond the range of 1000 AU (Grenzstrahlen, Roentgenrays, etc.) are not classified under the name "ultraviolet." Modern bio-physico researches have

shown that in the range of these rays are bands with varied biological effect which have more or less specific actions. Still, we only prescribe ultraviolet rays as if that word had a definite biological meaning.

Of course, it is a fact that the effects of the various bands overlap, that though some bands are very effective in certain ways, other bands can produce the same result if applied for a longer time and at close range. Thus the line 2554 has a strong bactericidal effect and produces a strong though short-lived erythema in a few seconds while the band around 3100 has a very strong erythema producing effect in a few minutes and a weaker bactericidal action. But then we know that all these electromagnetic waves and even the infrared rays can produce an erythema. After all, a first degree burn produced by heat rays would be hard to differentiate from an erythema produced by the band 2554.

Antirachitic action is strongest between 2700 and 3000 AU, but other wave lengths have an antirachitic action too, though of vastly less strength. The modern technic has produced light sources which supply electromagnetic waves of different wave lengths with a maximum effect at certain bands. We are thus enabled to select for the treatment such lamps which supply just that type of rays that we desire for a certain purpose. If we intend to prescribe such rays it would be out of date and we should be lagging behind to prescribe simply "ultraviolet rays" and to use any kind of lamp giving out these rays. We ought to prescribe instead such appliances which are particularly rich in those bands which are needed.

The Council of Physical Therapy of the American Medical Association made an announcement that ultraviolet rays have been found effective only against rickets. This statement is somewhat too guarded and does not cover all the facts. It is explainable on the basis of the present custom of linking a therapeutic procedure with a clinical diagnosis. Even though only the antirachitic rays have a specific action on rickets and allied ailments, rays of other wave length have a strong physiological effect which, while not effective in the case of a specific disease, may be very valuable in the treatment of certain pathological conditions.

Rays which produce a strong erythema may often be applied for therapeutic purposes with better results than any other form of treatment, because the hyperemia lasts longer than one produced by any other procedure. Drs. Kobak and Frankel have reported the great value of erythema producing rays in the case of brachial neuritis and I can corroborate their statement from my own experience.

If we speak of a bactericidal action this does not necessarily mean that the bacteria in the body are killed outright by the rays but that they stimulate the tissue in its defensive action. Nobody doubts the results of sunlight on bone tuberculosis though it is certain that we have to deal here with an indirect effect. The surgeon who opens an abscess does not cure the abscess. He only makes healing possible or facilitates it.

This brief comment is meant as a suggestion to do away with the term "ultraviolet rays" and to replace it, as it has been my practice for years by the recommendation of those bands which produce the desired effect. It would then be easy to select those appliances which emit the desired rays in the purest and strongest form.

ARCHIVES of PHYSICAL THERAPY, X-RAY, RADIUM

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EDITORIALS

ELECTROSURGERY IN RELATION TO THE TONSIL PROBLEM

The interest and enthusiasm displayed by an overflow audience when the symposium on electrocoagulation of tonsils was conducted at the eleventh annual session in New York prompt a further consideration of this very important subject. Although there are seven original papers dealing with the problem appearing in this issue, the authors have failed to present some of the more salient points which merit discussion at this time. On the whole, the symposium attempted to bring out the indications and limitations for electrocoagulation of tonsils, the technic and the evaluation of the method. In no instance, however, was a comparison drawn between the end results of electrosurgery and surgery beyond the statements that one is superior to the other.

A study was made by Hollender[1] in which he compared 200 tonsillectomies by electrocoagulation with an equal number of surgical removals and found that certain definite observations stand out:

1. For local surgical tonsillectomy infiltration of novocain gave an adequately painless field for operation. Infiltration anesthesia proved unsatisfactory for the electrosurgical procedure because the waterlogging of the tissues added greatly to the severity of the local reaction. Topical application of cocain and other solutions was not sufficient to insure against pain from the electrocoagulation treatment. When topical anesthesia was employed, the severe reaction which followed infiltration anesthesia was absent.

2. The local reaction of surgical removal was in most instances less than that of elec-

trosurgery when infiltration of novocain was employed. The local reaction from electrosurgery was always less with topical anesthesia than surgery with infiltration.

3. The period of convalescence from surgical tonsillectomy varied from two to ten days, while the average time of absence from occupational duties was three days. When fractional electrocoagulation was used, the patients attended their usual duties, and in only a few instances were unable to partake of their regular meals.

4. Hospitalization was routine in the surgical removals, while the office served for the electrosurgical method.

5. In surgical tonsillectomies no secondary hemorrhages were encountered, and in only one case was there a severe hemorrhage at the time of operation. No primary or secondary hemorrhages occurred in the series of electrosurgical removals.

6. There were no unusual complications from either the surgical or the electrosurgical removals.

These observations should answer many of the questions which are repeatedly asked and regarding which there seems to be much indecision.

So far as the indications are concerned, only four absolute indications can be accepted as having a scientific basis. These are: (1) tonsillar stumps; (2) diseased tonsils in the tuberculous; (3) hemophilia or delayed clotting time of the blood; (4) hypertrophy of the lingual tonsil and lymphoid tissue of the pharynx. Other indications may exist, but it is doubtful whether they can be established scientifically. The economic aspect and the refusal of the patient to submit to surgery are indications which may prompt the advice of a substitute such as electrosurgery, but it is questionable whether these are not influencing circumstances rather than indications.

It is true, also, that patients with cardiac lesions are safer risks for electrosurgical tonsillectomy than for surgical tonsillectomy. Yet, surgical enucleation has been repeatedly practiced in cardiac patients and most often without hazardous results. No one has yet definitely compared the results of both procedures in a series of cases. The impromptu statements of enthusiastic workers who base their results on a few isolated cases cannot be accepted as definite scientific evidence.

The disadvantage of a lack of uniformity of technic has not been sufficiently emphasized. The same might be said, however, of surgery, although it does appear that surgical methods are somewhat more standardized. Trainor's[2] assertion that the results are uniformly good with electrocoagulation irrespective of the technic employed must be severely criticised. Evidently this author has failed to observe the results in large series of cases where different technics have been tried to test their efficacy. It is true, on the other hand, that a certain technic can be perfected and employed satisfactorily by one operator and fail in the hands of another.

The comparison of end results by both methods is always an interesting matter. In this respect it is doubtful whether electrosurgery has fared worse than surgery. Painter[3] in discussing important points in tonsillectomy writes: "In my work at the Research Diagnostic Clinic, I often feel greatly chagrined to have the patient state emphatically that his tonsils are out because they were removed by a specialist, only to find a miserable looking throat, with badly infected stubs and considerable scarring. These patients come from a wide area; the condition exists all over the country. We have the privilege to demand tonsil work only as we merit it, by at least reversing our figures to 73 per cent of perfect postoperative results instead of the 28 per cent or less as it stands today.

With electrosurgery carefully and scientifically performed one should be able to remove every vestige of tonsil tissue. This has been repeatedly emphasized and it is a fact. The thing resolves itself not on the ability to do it but on the ability to recognize when all the tissue has been extirpated.

Is one justified in condemning a method because it has been taken up by the charlatan? The irregular attempts to treat other maladies by methods similar to those employed by the medical profession. The regular physician should be able to overcome this situation by training and equipping himself to do superior work. And while this may follow, there will always be a certain percentage of the laity who prefer to entrust the treatment of their ills to the quack.

We still believe surgery will probably continue to be the method of choice for the removal of tonsils in the large majority of cases. For special cases diathermy must be entertained as the best substitute method now available.

It is hoped that electrosurgery of tonsils will eventually be more successfully performed. The narrow views of our undergraduate and

graduate medical schools must be let down. They should open their doors and view the matter with an open mind. The time has come when the laryngologist should be given the opportunity to acquire the training this work entails by qualified instruction, and the medical school is the only place where this instruction should be given.

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ELIMINATION OF ADVERTISEMENTS OF DIATHERMY APPARATUS MANUFACTURED BY FIRMS THAT PROVIDE CLINICAL INSTRUCTIONS IN PHYSICAL THERAPY PROCEDURES

At a recent meeting of the A. M. A., the Board of Trustees voted to instruct the advertising committee of the Association not to accept advertisements of Diathermy Apparatus manufactured by firms that employ persons to give clinical instructions in physical therapy procedures.

This is a very wise move. It will help greatly to eliminate the commercial courses which have been responsible so frequently for the exaggerated claims made for the value of physical therapy procedures. When a physician attends one of these courses, the general impression he receives is that, with a few days of instruction given, together with the types of apparatus displayed, he would be able to specialize in physical therapy.

It is no more possible to do good physical therapy after attending such a course than it would be to do good surgery or good roentgenology after a few days of desultory instruction. Such courses have interested many physicians in physical therapy; but all too frequently these physicians have been disgusted by the half truths presented.

It is far better for organized medicine to present such introductory courses in a properly conservative manner. This was recently done, with great success, by the Philadelphia County Medical Society. No physician who attended the course given by this County Society came away with the impression that he could immediately perform miracles with physical therapy. On the contrary he was impressed with the complexity of physical therapeutic methods, and he likewise realized the limitations of this branch of medicine. He did have a clearer knowledge of physical therapy, and he did know which methods were applicable to general practice and which should be left to the specialist in physical therapy. — Editorial, *Penn. Med Jour.*, **35**:791, August, 1932.

DISTINGUISHED HONOR ACCORDED DR. BLECH

It affords us great pleasure to bring to the notice of our readers a member of our Congress and editorial staff, whose qualifications particularly fit him to represent the surgical aspect of physical therapy. We refer to Dr. Gustavus M. Blech of Chicago, a general surgeon with wide clinical and teaching experience, who was doubtless one of the first in America to appreciate the value of physical methods in surgery.

After extensive study in Europe he not only introduced to the American profession Bier's method of treating surgical infections by hyperemia, but edited for two years the Journal of Physical Therapy, solely for the purpose of popularizing physical medicine, especially in chronic surgical affections. Today he is a staunch adherent of electrosurgery in selected surgical conditions.

In addition to this work Dr. Blech has for many years been interested in military surgery and military sciences, having been inspired by the labors of such men as Pirogoff, Stromeyer, v. Bergmann, Larrey and others. Aside from actual service in three campaigns, he has studied the medical services of foreign armies and written extensively on medico-military problems.

This work has been recognized by foreign powers, so that when wearing the uniform of a colonel of the medical reserve corps of the United States Army he is entitled to display military decorations above the ordinary number. Aside from numerous war medals, he has been awarded, in 1909, the Grand Cross and Star of the Imperial

and Czarist Order of St. Stanislaus. During the World War and soon after he was awarded the Legion of Honor, by France. In 1919 the French minister of Public Instruction and Fine Arts awarded him the highest academic decoration — the gold university palms, grade of Officer of Public Instruction. In 1930, the ancient city of Langres, made famous through the French philosopher Diderot, conferred on him the right to use the city's coat of arms as his own.

A few days ago an honor as rare as it is unique was conferred upon him by the Governor General of the Order of St. George at Brussels, Belgium, by the parchment and decoration as a commander of that order, created by Philippe of Milan, in 1390, and aproved by a special papal bull, in 1485, by Innocent VIII.

All these honors have only served to stimulate him to further accomplishments in his chosen specialty. We are sure that his acquisition to our editorial staff will prove of special value to the ARCHIVES, since being an accomplished linguist, Dr. Blech is in a position to follow the international literature with ease and understanding. The Congress of Physical Therapy extends heartiest felicitations to Dr. Blech on the acquisition of his latest high honor.

New Apparatus for the Production of Radon

Addressing the Academy of Sciences, Professor d'Arsonval described a new apparatus that enables one to secure at once a continuous supply of radon, or emanation of radium, without the use of a solution of radium salts such as has been employed since the introduction of the Curie method, the application of which requires an extremely complicated apparatus. With the aid of his assistant Georges Vandon, Professor d'Arsonval has been doing research work on the subject, in his laboratory, since 1925. It required a long period of study, which was taken up by Vaugeois and, after his death, by Godin. It was a question of finding a stable source of radium emanation that could be substituted for the radium-bearing solution of Curie — a substance of small volume and not requiring any manipulation; a source adapting itself easily to a whole series of substances and thus making it possible to charge with radium emanation solids, liquids and many different gases, with a view to their application in therapeutics. The apparatus has now been completed. It is a simple metal tube containing a radium or a thorium salt, specially prepared in accordance with the formulas established by Vaugeois, which liberates, for a given time unit, at room temperature and without previous manipulation, the quantity of emanation for which it was constructed. The regularity and the constancy of the emission of the emanation, under these conditions, are maintained remarkably. The Vaugeois apparatus has the advantage of bringing a pure emanation, without any radium-bearing salt, in contact with the tissues. One avoids thus the destructive effects caused by the direct action of radium on the cells by reason of its long period of transformation and the difficulty of its elimination by the organism. This procedure makes radon treatment practical and eliminates all danger. — Foreign Letters, *Jour. A. M. A.*, Sept. 24, 1932.

Passing of Dr. Allison

On August 30, the career of the noted orthopedist, Dr. Nathanial Allison, was cut short untimely by heart disease, he being only 57 years old.

Dr. Allison was a graduate of Harvard University Medical School and from 1919 to 1923 was dean of orthopedic surgery at Washington University, St. Louis, after which he became professor of orthopedics at his alma mater. In 1929 he organized the department of orthopedic surgery at the University of Chicago and was given the title of non-resident professor.

During the War, Dr. Allison was Chief of Orthopedics in the A. E. F., with the rank of Colonel. He was a fellow of the American College of Surgeons and a past-president of the American Orthopedic Association, as well as belonging to many other scientific societies, and a free contributor to the periodical literature of his specialty. He also devised a number of appliances for use in orthopedic surgery.

CURRENT NEWS AND SCIENCE

Treatment of Whooping-Cough by U-V Irradiation

Describing his experiences in treating with ultraviolet radiation from a mercury arc such cases of whooping-cough as he met in his private practice and among in-patients at the Uxbridge Joint Isolation Hospital, Arthur J. Turner records (in *The Practitioner,* Jan. 1932), that he "would not now think of treating any case of whooping-cough, free of complications by any other means."

Among the advantages he claims for this method are as follows: — "First, there is no uncertainty as to the medicine being retained; next, there is no unpleasantness of taste to add to the child's distress; neither is there the fright of needle injections. The control of symptoms is speedy, if not wholly, at least in part. There is, therefore, less loss of nourishment and of strength, less mental as well as less physical distress, less cough and, therefore, more sleep. So much is this the case, that my patients invariably concluded their attack in a better condition than they commenced, and were in no need of being sent to the country for a costly convalescence."

"Symptoms had all disappeared and the child was apparently cured, on an average, in twenty days. One case recovered after seven days' treatment, another after nine, but none lasted more than four weeks. This compares very favorably indeed with the six to eight weeks or more of past experience."

The average age of the patients was five years, though one particularly severe case was a baby of only 8 months. In every case the diagnosis was beyond doubt, and in no case did serious complications occur. This the author believes to be due to the rapid improvement in symptoms and general condition.

Regarding technique, the author writes: — "My plan was to expose the whole body to the ultraviolet rays at a distance of 36 in., the patient lying down, first on the back, and then prone. Until the principal symptoms had disappeared, this exposure was made once a day, and then twice a week for one or two weeks. The first dose varied with the age of the child from half a minute to two minutes both to back and front. Each day the dose was increased, in the youngest by half a minute a day, in the older ones by one minute each day. I am not a believer in large doses, especially when given every day, as it is very important *not* to produce any pigmentation of the skin, such pigmentation when produced tending to obstruct the passage of the rays."

"The improvement in the patient's general condition is usually noticeable from the first exposure to the light, and consists in an obvious brightening and happiness, increase in the amount of sleep obtained, increase of appetite, and later in tonicity of muscles, and if old enough, a readier response to questions put. Parents have been enthusiastic about the changes produced."

The U-V method, the author points out, not only obviates the need for a country or seaside holiday during convalescence, with its attendant expense and loss of school time; but it also secures "a great reduction in the debility suffered not only by the patient, but by the parents through lack of sleep and loss of rest." — *Brit. J. Phys. Med.,* June, 1932.

Beam Radio May Result in Signals Sent to Mars

Inhabitants of the earth are a step nearer successful communication with neighbors on Mars (if any!) and other nearby planets following the recent development of ultrashort wave beam radio.

This is the belief of Dr. I. E. Mouromtseff, research engineer of the Westinghouse Electric and Manufacturing Company, who has been directing the output from a short wave transmitter as if it were the beam of a searchlight, sending it from the top of one building here to the roof of another more than a mile away.

The energy that can be concentrated into a narrow radio beam is sufficient to pierce the Kennelly-Heaviside layer in the outer atmosphere which reflects back to the earth the longer waves in common use, Dr. Mouromtseff thinks.

"It is conceivable," he stated, "that the power we have succeeded in getting into our 42-

centimeter beam is sufficient to pierce the Kennelly-Heaviside layer and travel the 35,000,000 miles to Mars. It is possible that such small power may carry such great distances because practically all the intervening space is a high vacuum and does not absorb the waves once they get through the earth's atmosphere."—*Science News Letter,* January 30, 1932.

Methods of Measuring Electron Rays Perfected

The methods of measuring the powerful Lenard or electron rays have been perfected by an investigation of Dr. Lauriston S. Taylor of the U. S. Bureau of Standards.

Lenard rays are obtained by pushing electrons through a vacuum tube under a pressure of several hundred thousand volts. By use of a small window of metal or glass the speeding electrons can be obtained in the air outside of the tube. As they have been used, since their first production in large quantities by Dr. W. D. Coolidge, for a great variety of chemical and bilogical purposes it is important to have an accurate method of measuring them.

Three methods of measuring the rays were compared. Of these the use of a "Faraday chamber" was found to be most effective. This consists of two metal chambers enclosed one within the other and having openings through which the electrons may pass to the inner chamber.

The difficulty of making this measurement lies in the fact that the swift electrons striking a metal surface set free other electrons, so that the total amount of electricity cannot be obtained without some difficulty.—*Science News Letter,* January 30, 1932.

Radiological Institute at Washington University

The new Edward Mallinckrodt Institute of Radiology, at Washington University School of Medicine, St. Louis, representing an investment of $1,220,000, is now in almost complete clinical operation. The eight story building houses the roentgenologic activities of the school of medicine and the allied hospitals. The second, third and fourth floors are reserved for general roentgenologic, surgical, urologic and gastro-intestinal diagnoses; the waiting rooms have been planned to eliminate confusion in separating hospital and dispensary cases and making further division of patients by sex and race. The time necessary for a diagnosis has been shortened by having dark rooms on each of these floors, all the chemicals for which are mixed in central tanks on the fifth floor and fed to the individual dark rooms below through specially constructed pipes. The fifth floor has been set aside for treatment work, the sixth for research in the physics of radiation, and the seventh for roentgen research on animals, but these are not yet in use. Since treatments comprise less than 5 per cent of the work done at the institute, they are now being given in smaller quarters in the basement. The institute was erected under the direction of Dr. Sherwood Moore with funds provided by the late Edward Mallinckrodt, Sr., and by Edward Mallinckrodt, Jr. Special apparatus, worth $20,000, was provided by John F. Queeny, and his son, Edgar M. Queeny, and the General Education Board gave the endowment of $750,000. A memorial room is planned on the main floor of the institute for Dr. R. Walter Mills, who, as director of the department of radiology, planned the development of the institute. Dr. Mills died in 1924 from overexposure to x-rays. Since his death, the project has been carried on by Drs. Moore, Evarts A. Graham and W. McKim Marriott, dean of the medical school.—*Jour. A. M. A.,* (Feb. 6), 1932.

Radon In Chronic Arthritis

The treatment of arthritis by oral administration of radon (radium emanation) is reported by Rathery and Monnery in *Bull. Acad. Med.* (105, p. 624). The dosage was 150 to 300 millimicrocuries daily, beginning with the smaller amount and gradually increasing. The cases represented various types of subacute and chronic arthritis, including the gouty types and arthritis deformans. No other treatment was given, but a fixed diet was prescribed, with a restriction of purine-containing foods. Treatment was continued for a month.

It was found that in the great majority of cases the treatment caused an increase in the total urinary excretion and in the excretion of purines and uric acid; also a diminution in the blood uric acid. Clinically the treatment relieved pain, diminished the articular swell-

ing and increased motility. The patient's general condition was also improved, but the relief of pain was the most immediate and most striking result. Some definite improvement was shown by all but 2 of the 25 cases treated. — *Brit. J. Phys. Med.,* June, 1932.

Vitamin C Derived From Poison Found in Opium

The parent substance of the life-essential, scurvy-preventing vitamin C is none other than the poison narcotine, investigations of Dr. Otto Rygh, his wife, Dr. Aagot Rygh, and Dr. Per Laland of Oslo have shown. Narcotine is one of the alkaloid poisons found in opium and is related to morphine, but in spite of its name does not have any narcotic effect. It is transformed into vitamin C during the ripening of fruits and vegetables.

The isolation of vitamin C and discovery of its parent substance came as a result of studies of the occurrence of the vitamin in various fruits and vegetables such as oranges, lemons, tomatoes, white cabbages and potatoes. The Norwegian scientists found that narcotine was present in the unripe fruits but gradually disappeared as the ripening proceeded and the ripe products contained the vitamin but no narcotine.

Guinea-pigs were then fed on a diet containing narcotine and on a diet containing narcotine that had been exposed to ultraviolet light; both groups of guinea-pigs died at the same time, but the group that had been fed on the solarized product showed no signs of scurvy while the other group was severely affected with it.

It was next found that methylnornarcotine, derived from narcotine, could prevent or relieve scurvy. It was also found that narcotine was converted into an anti-scorbutic by submitting it to the action of germinating seeds.— *Science News Letter,* February 20, 1932.

Light Velocity is Key to Other Numerical Constants

Physicists have acknowledged that light's velocity is one of the most fundamental constants of nature, and now Prof. J. E. Mills, University of South Carolina chemist, has discovered that this speed is a numerical masterpiece for computing other constants used in science.

By using a formula that involves the velocity of light as the circumference of a circle and certain other relations involving the velocity of light, Prof. Mills has been able to derive with great numerical accuracy the values for the geometrical constant, the mass of the electron, the mass of the proton, Planck's constant, the electronic charge, the gravitation constant, and Boltzmann's constant, all of which are familiar to physicists. It is necessary to ignore the placing of the decimal point, however.

Prof. Mills believes that it is not possible that any merely accidental agreement could produce the numerical agreement he has achieved and he therefore suggests that the relationships he has found are real and not merely mathematical. — *Science News Letter,* April 9, 1932.

Leafy Vegetables Test As Good Anemia Tonic

If leafy vegetables can be made popular food in the South, the nutritional anemia now prevalent in many rural districts may be decreased.

This is the moral from a scientific study on diet reported before the American Home Economics Association meeting in Atlanta. Miss Olive Sheets conducted the feeding experiments at the Mississippi State College, using anemic young rats for her subjects.

In some parts of the rural South, the diet contains too little iron, Miss Sheets explained. This produces nutritional anemia. Since the climate in the southeastern United States is suitable for gardens nine to ten months of the year, Miss Sheets determined to conduct tests to see whether vegetables containing iron would prevent or alleviate the anemia.

So far, she reported, she has studied mustard, turnip tops, spinach, collards, two varieties of lettuce, and also cow peas. These vegetables "have decided anti-anemic potency," Miss Sheets said. Spinach, one of the best iron foods, is seldom eaten by southern rural people, she stated. — *Science News Letter,* July 9, 1932.

U-V Rays at Zoo

Apparatus for generation of U-V rays has been installed at Clifton Zoo, Bristol, in the ape, giraffe and elephant houses. Combined with vitamin-containing foods, the apparatus is reported to be giving very satisfactory results. — *Brit. J. Phys. Med.,* June, 1932.

Rejuvenation by Physical Methods

A new physio-therapeutic method of regeneration, or rather rejuvenation, is described in a preliminary communication by Dr. Erich Schrötter-Kristelli in the *Wiener Med. Woch.* (p. 623, May 14, 1932). In his introduction he states that the divorce between scientific research and practice in influencing the functions of organs or groups of organs is especially noticeable in the question of internal secretions. This applies to those complaints which may be traced to hypofunction or dysfunction of the male organs of generation, concerning the nature of which we are very uncertain. After mentioning Berthoid's (Göttingen) transplantation experiments of 1849, and Brown-Sèquard's of some 50 years ago, and the important results obtained lately by Voronoff and Steinach, the author goes on to the experiments of Liebesny (Vienna) in diathermy of the testicles.

"As a result of these observations and experiences," he says, "we started to construct an apparatus working on a physico-therapeutic basis, which in experiments has proved thoroughly reliable. This apparatus, called *pelithe*, consists of a combination of radioactive and thermic radiations. It is essentially a somewhat suspensory-shaped applicator made of rubber, into which ribbon-shaped strips containing a solution of radium chloride are vulcanized. In this way an exact limitation of the radiations is attained, while they are at the same time constant. This is due to the 2 mm. thick layer of rubber which absorbs the alpha and beta rays, while allowing the gamma rays to act. Animal experiments with the *pelithe* apparatus have shown that it brings about a considerable stimulation of cell growth, especially of the interstitial cells. It is further clear that the heating up (? by diathermy — *Ed.*), of an organ like the testicles, so richly supplied with blood-vessels, must quickly result in a hyperæmia, which is doubtless capable of strengthening the effect of the gamma radiations."

So much on the theoretical side. Practical tests were difficult at first owing to the deficiency of suitable material, but the author succeeded in getting sufficient patients in Paris and Budapest, and later in Vienna, to form an adequate collection for observation. In this way he was able to confirm very fully the therapeutic value of the apparatus, in cases of premature senility, and of convalescence (whether from chronic disease or after operation), as well as in many chronic diseases of the nervous system. "Whether" the author proceeds, "these considerations and experiences are referable to the increase of the inner secretory activity of the generative glands and this again on the reaction of these functional improvements on the whole organism, one thing was clear from the first, viz., that the *pelithe* apparatus has great possibilities in the treatment of the generative glands and the whole of the genital organs."

Emodi (Budapest) has tested the method on a large number of cases and is absolutely satisfied with the results. His view is that the good results of the *pelithe* treatment in primary and secondary diseases of the testicle and epididymus is due to the hyperæmizing effect of the apparatus while the good effect on the various potency troubles which he observed was due to the stimulating effect of the radium emanations. To summarize, in the author's words, "It can be said that the results both of experiments on animals and of clinical tests of the *pelithe* apparatus were highly satisfactory and full of promise of success. A report on further experiments, will be given in due course."

[In this connection it should be remembered that the testicles have been found very sensitive to x-rays. It has been established that an overdose, or continual exposure to low intensity radiation, can produce sterility. In these circumstances it is clear that the dosage of gamma radiation from radium will have to be kept very small until the danger point is established. No details as to the quantities employed in the above apparatus are at present available. — *Ed.*] — *Brit. Jour. Phys. Med.*, August, 1932.

Half of Mental Disease Caused by Focal Infection

Half of the patients in hospitals for mental disease owe their illness to definite changes in the tissues of their brains brought about by chronic infections of teeth, tonsils, sinuses or digestive tract, in the opinion of Dr. Henry A. Cotton, director of research at the New Jersey State Hospital.

By eliminating the chronic infections in these patients, Dr. Cotton and associates were able to double the number of recoveries at the hospital during the last thirteen years. Two thousand instead of one thousand patients re-

covered during that period. Incidentally the State saved for at least six years $1,000 a day for the maintenance of these patients, leaving out of consideration the large amount saved in cost of construction of a new building to care for that number.

Dr. Cotton began working along this line back in 1905 in Munich. At that time he found there were definite changes in the brain in the functional disorders, which he says afflict one-half of the patients in mental disease hospitals. Still later he found that it is chronic infection which produces a poisoning that destroys the brain tissue.

In order to prevent the occurrence of mental disorders as well as many physical disorders Dr. Cotton advocates searching for and cleaning up chronic infections in children. —*Science News Letter,* July 9, 1932.

German Scientist Confirms Existence of Neutrons

Both neutrons and gamma rays are given off when the metal beryllium is bombarded with the hearts of helium atoms, Dr. F. Rasetti of the Kaiser Wilhelm Institute for Chemistry in Berlin, Germany, has concluded after repeating the experiments of Drs. W. Bothe and H. Becker, German physicists, Mme. I. Curie-Joliot and Prof. F. Joliot, French experimenters, and Dr. J. Chadwick of Cambridge, England, which had been interpreted both as artificial radioactivity and as demonstrating the existence of the neutron, close combination of electron and proton. The neutrons are detected most readily in an ionization chamber and the gamma rays, like those from radium, are detected by a counting tube. —*Science News Letter,* April 23, 1932.

New Method Measures Size of Germs Totally Invisible

Germs so small that they cannot be seen with the most powerful microscopes have nevertheless been measured and their size has been determined by a new method developed by Prof. H. Bechhold and Dr. M. Schlesinger of the Frankfort Institute for Colloid Research in Germany.

This new development is of particular importance because a number of disease germs, notably those of smallpox, measles, yellow fever, rabies or hydrophobia, and possibly influenza and the common cold are so small that they cannot be seen even with the most powerful microscopes. Because they are invisible and the classic methods of bacteriology are not applicable to them, many investigators have come to the conclusion that they do not exist at all, and that the maladies said to be caused by them are in reality chemical intoxications by some unknown poison.

It was found by the new method that the germ of smallpox is from 21 to 23 hundredths of a micron in diameter. One micron is one thousandth of a millimeter, which in turn is about one twenty-fifth of an inch. The germ of chickenpox is smaller, having a diameter of from 12 to 13 hundredths of a micron, which makes it only about half as large as the germ of smallpox.

The bacteriophage, which preys on the germs just as they prey on animals and humans, is very much smaller than these two germs, however. Its diameter measures between 12 and 20 millimicrons. Since a millimicron is one thousandth of a micron, this shows that the bacteriophage is about one-tenth of the size of the tiny chickenpox germ, for instance. Its very small size seems to prove that it is no organism but a special stuff, in the opinion of the men who have measured it.

Prof. Bechhold and Dr. Schlesinger succeeded in determining the size of these tiny organisms by a simple method of combined filtering and centrifuging. Prof. Bechhold devised ultrafiltration methods and consequently was able to procure filters with very small pores, having a diameter of 1/250 millimeter. The centrifuge used made 10,000 revolutions per minute. Prof. Bechhold found a general formula by which may be calculated the correlation between decrease of concentration and size of the particles of a semifluid substance centrifuged at high speed. From this formula and the known diameter of the filter pores, the investigators determined the size of the germs. Inoculation into animals proved that the material measured was capable of producing the disease in question.—*Science News Letter,* February 13, 1932.

THE STUDENT'S LIBRARY

ELECTROSURGERY. By *Howard A. Kelly,* M.D., LL.D., F.A.C.S., Professor Emeritus of Gynecology, Johns Hopkins Medical School; and *Grant E. Ward,* M.D., F.A.C.S., Assistant in Clinical Surgery, Johns Hopkins Medical School, and Instructor in Surgery at the University of Maryland. Cloth. Pp. 305 with 352 illustrations. Price $7.00 net. Philadelphia: W. B. Saunders Company, 1932.

Very often a book is as much an index of the trend of its period as it is a forerunner of the growing sentiment in the field that it attempts to exploit. An example in line with this generalization is the publication this year of the most ambitious American work on Electrosurgery — this, at the very period when its discipline has gathered new momentum by virtue of the recognition accorded it by outstanding surgeons. It is now the consensus of opinion that this new surgery is about to enter the deep and peaceful waters of orthodox recognition and be scientifically exploited to its most useful range of possibility. The foregoing contribution is, therefore, timely in its arrival, because it has incorporated in its pages the most advanced as well as fundamental discussions on the subject of electrosurgery. The work has been written by surgeons well seasoned in their classical specialty and thus brings to these pages an orientation highly desirable in discussions of this new branch of surgery.

The book has that coordinated arrangement of subject matter to logically carry the reader through the various intricacies of its study without the least confusion. It embodies seventeen chapters and bibliography of most generous proportion. The reader is initiated into its principles and practice by way of a description of the historical evolution of its practice. The second chapter deals wth the *Physics of High Frequency Current* and offers an intelligent and detailed summary of one of the most interesting, important and fundamental features — the very background — to the subject. The proof of the utilitarian possibilities of high frequency surgery is first preceded by a chapter demonstrating *Clinical and Laboratory Observations on Histological Changes,* demonstrations profusely illustrated and well expatiated, hence impressive both to the eye and the critical mind. Few chapters will be found more meaty than that which deals here with *General Principles.* It is an answer to the question propounded by the authors: namely, "How far shall we in our Electrosurgical work adopt certain methods and precautions with which we have grown familiar in our general surgical operations?" Hence there is included here pertinent discussions on such practical considerations as the best place for operation with high frequency current, the dress of the surgeon and patient during operation; preparation of patient and surgeon prior to operation; the question of anesthesia; the technic most useful for the operation at hand; indications for secondary operations; post-operative care; the process of healing and grafting. The consequent chapters deal with the management of accessible and non-accessible neoplastic growth and their electrosurgical extirpation. These discussions cover such a wide range as to include affections of the skin, orificial involvements of entrance and exit, thoracic, abdominal and urologic localities, the fields of otolaryngology, gynecology, and the central nervous system.

It can be said that in the broadest sense of evaluation this book is undoubtedly the most scholarly contribution yet published in America. It presents the most authentic facts regarding principles and practice of electrosurgery, and yet is sufficiently adventurous as to indicate a new field of possibilities as yet only experienced by the select few. The book should be in the hands of every progressive surgeon.

DIE BEHANDLUNG DER KINDERKRANKHEITEN MIT UNTRAVIOLETT-UND RÖNTGENSTRAHLEN. By *Prof. Dr. W. Birk,* Vorstand der Universitäts-Kinderklinik in Tübingen, and *Dr. L. Schall,* Chefarzt der Kinderabteilung am Landeskrankenhaus Homburg-Saar. Second and fully revised edition. Paper. Pp. 256 with 45 illustrations, price Rmk 12. Berlin: Urban & Schwarzenberg, 1932.

The foregoing volume is a thoroughly revised edition on the treatment of diseases of childhood by means of ultraviolet and roentgen radiation. It succeeds the 1924 edition which came out under the title, "Radiation Therapy in Diseases of Children," and forms a part of the *Sonderbände zur Strahlen therapie* (Special volumes on Radiation Therapy), edited by that scholar, Professor Dr. Hans Meyer, and his coworkers. The book is divided into two sections: the first dealing with the theories, agencies and practice of ultraviolet radiation in such kindred affections as rickets, spasmophilia, tetany, and in chronic affections of bronchial and pulmonary origin, erysipelas, pruriginous and infiltrated affections of the skin, and its influence on the secretory glands of the breasts in the period of lactation. A separate chapter has been utilized not only to indicate the important rôle of ultraviolet radiation in children's tuberculoses, but also to permit more detailed discussion of the values, methods, limitations and results obtained under this therapeutic régime.

The second part of this work is devoted to the discussion of roentgen radiation in diseases of childhood. It forms the major opus of the book and hence greater detail has been introduced not only as regards the academic background which considers theory and principles, but also technic and practice as related to a host of pathologic conditions. This work rounds out a special phase of radiation therapy of importance to the pediatrician and general practitioner. It touches upon diseases encountered in every day practice by one or both, and it points out by concise and scholarly discussion and

case reports the effectiveness of both or either forms of radiation when intelligently applied.

The authors have incorporated a wealth of material by boiling down the essential facts related to this subject and thus have contributed a work of great practical value to modern medicine. It is not out of place to favorably comment on the excellence of the publishers work: the type is clear, the illustrations are sharply outlined, and both together add to the reader's greater comfort and sympathetic attention to the printed page. The book is highly recommended.

THE PRACTICE OF CONTRACEPTION. An International Symposium and Survey. Edited by *Margaret Sanger,* M.D., and *Hanah M. Stone,* M.D. Cloth. Pp. 313. Price, $4.00. Baltimore: The Williams & Wilkins Company. 1931.

This book is essentially a collection of reports from the Seventh International Birth Control Conference at Zurich, and is very thorough in its scope. All phases of birth control are presented and discussed by well known authorities. Part I — Contraceptive Methods — is divided into six sections. The first section on Mechanical Occlusive Methods is very ably presented by Dr. Hanah M. Stone, who expatiates on the vaginal occlusive pessary. This method is accepted by many authorities as the best one when used in conjunction with spermacidal pastes. At the end of this symposium, which is shared by three other authorities, we find many world famous investigators participating in the discussion, who add their opinions and findings on occlusive methods. In Section 2, the Graefenberg ring is the center of interest for intrauterine methods of contraception. Such well known names as Ernst Graefenberg, Norman Haire, and J. H. Leunbach present what may some day be a popular method of birth control. This method of contraception avoids the inconvenience and the frequent possibilities of technical error that occlusive methods sometimes encounter. Section 3 deals with chemical methods which today have doubtful value, and Section 4 discusses various biologic methods which are engaging many scientists in research investigation and promises some day to be a potent weapon in contraception. A discussion of sterilization and the methods available is presented in Section 5. The last section concerns miscellaneous adjuvants and methods.

Part II is rather a short discussion of abortion. However, we believe that prevention of conception is more in line with the policy of preventive medicine, and rightly this part of the book is the briefest. Part III of the book is very interesting and deals with reports from various countries as to the progress of contraception and the report of birth control as practiced in Soviet Russia is most illuminating. Russia has succeeded in reducing its excessive rate of abortion by disseminating knowledge and means for safe contraception and its government in this respect at least must be congratulated. The reviewer recommends this book to all those interested in this subject as a handy and interesting reference.

PRECIS DE RADIO-DIAGNOSTIC. By *Paul Lamarque,* Professor agrégé á la Faculté de Medicine de Montpellier. Preface by *Professeur E. Forgue,* Associé National de l'Académie de Médicine, Membre Correspondant de l'Institut. Cloth. Pp. 746 with 374 x-ray photographs and schematic drawings. Price 125 fr. Paris: Gaston Doin & Cie, Editeurs, 1932.

This volume helps to round out the ambitious literary attempt of Professor Forgue and those associated with him in the editing of a series of special medical contributions under the broad title L'Etudiant En Médecine. The extraordinary labors entailed in the compilation of this special work are a tribute to the science of x-ray diagnosis as practiced in France and demonstrated in these pages by Lamarque. The book is encyclopedic in scope, including as it does the alpha and omega of radiodiagnostic practice. It is a contribution in which theory and clinical exposition are reduced to terse statement of facts and where the profusely illustrated text reaches a high peak of artistic demonstration. Side by side with half tone plates of actual material the author has incorporated schematic illustrations, which bring out the diagnostic high lights of the conditions under study.

Briefly, the book addresses itself to the general practitioner and student. It opens with a general consideration of the apparatus required for radiodiagnostic purposes. The succeeding eleven, voluminous chapters deal with interpretations of special organs of the body. The various abnormal changes in hard, soft, tubular and other related structures of the body have been considered. As an example of the great detail devoted to the subject, the second chapter alone occupies the space of approximately 220 pages, and includes a range of topics of most of the possible changes that may be associated with pathology of the osseous system. As much may be said for the detail incorporated throughout the rest of the work, which includes discussions and expositions of a highly critical order in the fields of pulmonary, circulatory, digestive, biliary, urinary and genital organs of both sex, separate chapters have adso been included on the eye, car, nose and throat, neurologic and stomatologic systems. One closes the book with a conviction of the great practical importance of these studies as applied to diagnosis, and the need for greater orientation by the general practitioner with x-ray procedure. The individual practitioner would do well to have this volume close at hand for immediate reference in the many cases that demand diagnostic decisions above average importance.

THE PRACTICAL MEDICINE SERIES COMPRISING EIGHT VOLUMES ON THE YEAR'S PROGRESS IN MEDICINE AND SURGERY: DERMATOLOGY AND SYPHILIS. Edited by *Fred Wise,* M.D., and *Marion B. Sulzberger,* M.D. UROLOGY. Edited by *John H. Cunningham,* M.D., Series 1931. Cloth. Pp. 478, illustrated. Price $2.25. Chicago: The Year Book Publishers, Inc., 1932.

The observation that with each year the foregoing series has increased in bulk is not so pertinent as that they have grown in breadth of scholarship and

in greater demand. The foregoing volume not only fulfills the splendid example set for it by previous efforts, but it also introduces two coworkers in this enterprise who will in the future be responsible for the editorship of the section on Dermatology — Wise and Sulzberger. A rather shrewd innovation in keeping with wide experience in the compilation of medical literature has here been effected: namely, the more liberal attention to foreign literature in order to make accessible or available to those who either do not read or cannot afford the expense of foreign journals, the pertinent contributions contained in them. The compiled material has been critically reviewed and brought down to date. This section is well balanced, generous in size and includes those facts of interest to the general practitioner as well as the specialist.

The section on Urology forming the second half of this volume is under the competent editorship of Cunningham. The interpolated editorial comments throughout both sections form valuable conclusions for the reader's edification and guidance. For those interested in these specialties the above volume will be found of invaluable aid in daily practice.

MAN AND MICROBES. By *Stanhope Bayne-Jones,* M.D., Profesor of Bacteriology, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. Cloth. Pp. 128. Price $1.00. Baltimore: The Williams and Wilkins Company and Associates in cooperation with The Century of Progress Exposition. 1932.

This is a little volume belonging to "A Century of Progress Series." This series covers subjects on anthropology, astronomy, chemistry, evolution, geology and several of the other fundamental sciences.

In the preface the author states that he has tried to give the microbes their due, indicating their usefulness and essential activities as well as their devastating effects. As the subject is a large one, it was necessary to omit much detail in the writing of a small book such as this.

The story begins with van Leewenhoek's making of the microscope. While there had been some talk about "invisible germs," "apparatus and the experimental method were needed to show that microbes existed and to test the notions about what they could do."

Chapter III, dealing with microbes in air, water and sewage gives in elementary fashion certain facts which the lay person should know. Bacteriology and sanitary control are interrelated. Obviously, sanitation is no small problem in our villages, towns and metropolitan cities.

Other subjects which are dealt with in separate chapters are: Microbes and Plants, Microbes and Insects, Microbes and Diseases of Animals, and, Microbes and Diseases of Man. According to the author, while the evidence presented in these chapters is far from being complete, it indicates that there is little exaggeration in the statement, that microbes are the masters of men.

The concluding chapter is on Microbes and Civilization. It endeavors to show that man is dependent on some microbes for some of his daily food. On the other hand, man's life is constantly endangered by microbes. It is unquestionably true that man has acquired much information about disease since the discovery of germ life. Experimental research has been responsible for much of our newer knowledge of the relations of microbe and man. While there is a vast knowledge still open for investigation, the past century has added to medical science a clearer comprehension of the causes of disease, and with this better understanding, our ability to control it has been greatly enhanced.

The reviewer believes that this little book is highly informative and should prove fascinating to the individual who possesses little or no fundamental knowledge of medical subjects, and especially the subject of bacteriology.

UNITED STATES ARMY X-RAY MANUAL. Authorized by the Surgeon-General of the Army. Second edition. Rewritten and edited by *Lt. Col. H. C. Pillsbury,* M.C., U. S. A. Flexible leatherette. Pp. 500 with 228 illustrations. Price $5.00. New York: Paul B. Hoever, Inc., 1932.

This practical work shows much revision and valuable literary expansion. It has incorporated an increasing volume of up-to-date information, developed since the first edition was published. Descriptions of new types of apparatus and appliances have been added, and complete rearrangement of the section on physics has been perfected. Discussion of gas tubes and induction coils has been placed together for the benefit of those who still use or feel their need. The technic has been condensed into one chapter. "Exposure tables," explains the editor, "are furnished, that may serve as a basis upon which the operator may build an exposure technic adapted to his own apparatus, and which will best meet his individual problems. As an exception, the technic for exposing sinus and mastoid films is described in the section devoted to their interpretation; the technician making films of these parts must understand the principles of their interpretation or failure will surely result. The sections on interpretation have been amplified and brought up to date. New illustrations have been borrowed from many sources."

The foregoing manual is a condensed description that covers apparatus, technic and interpretation. The discussion throughout is concise and free from padding or speculation. It is practical in scope and is based upon the purpose of furnishing the greatest information with the least expenditure of theory or speculation. It is a book that should be at the ready reach of all who anticipate practicing or already employ x-ray apparatus.

INTERNATIONAL ABSTRACTS

Hypertrophy of the Lingual Tonsil and Lymphoid Tissue of the Pharynx; Reduction by Electrocoagulation. A. R. Hollender.

Laryngoscope, **42**:622, (August) 1932.

Hollender describes the accepted methods of surgical management of the lingual tonsil and lymphoid tissue of the pharynx. Electrocoagulation is advocated because of its simplicity of technic and the specificity of results. He states, "mild electrocoagulation has been found to be a successful means of dealing with lingual tonsils which have become hyperthophied. The treatment is similar to that of electrocoagulation of the faucial tonsils. Two or three series of punctures for each mass usually suffice." The paper concludes with the following comment: "Hypertrophy of the lymphoid tissue of the posterior wall and lateral folds of the pharynx occasionally requires active treatment. When the hypertrophy is not marked, removal of the local cause, or elimination of the systemic factors, produces amelioration of the symptoms. In the more advanced cases, however, in addition to such other measures as may be indicated, reduction or destruction of the lymphoid masses is indicated. For either purpose the electrocoagulation puncture method is an improvment over the cautery electrode."

Report of Three Cases of Diseased Inoperable Tonsils Eradicated with Radium. Dr. J. Coleman Scal.

Laryngoscope, **42**:620, (August) 1932.

Scal reports three cases of inoperable tonsils treated by radon seeds. The seeds used were small, platinum capillary tubes, 4 mm. long and 1 mm. wide, a strong thread being attached to their ends. The seeds were inserted centrally into the tonsils and removed by their attached strings on the fifth day. The amount of platinum filtration is sufficient to exclude the caustic beta rays and thus prevent any necrosis of tissue.

In all the cases the tonsils decreased in size within several months, so that only a fibrous nodule remained, seen on pillar retraction. There was a concommittant improvement in all symptoms.

Ultraviolet Treatment of Miners' Nystagmus, with Notes of Six Cases. F. O'Sullivan.

Brit. Jour. Phys. Med., **7**:23 (May) 1932.

The lamp O'Sullivan uses in the treatment of miners' nystagmus is the quartz mercury vapor type, in preference to the carbon arc. The patient starts with three minutes of exposure, at 1 meter, increasing daily up to five minutes, and later to fifteen minutes, for a period of five or six weeks if necessary. The first sign the author has observed, when carrying out treatment, and which encouraged him to persevere, was that in all cases the conjunctival hyperemia observed in most cases of early miners' nystagmus cleared up very quickly. In nearly all cases under treatment, the patients were back at work within eight weeks, with little or no symptoms or physical signs. The ultraviolet irradiation was usually given as a general body bath. A few patients were treated by short local exposures, the patient wearing no goggles but keeping the eyes closed. Ultraviolet irradiation alone will not give immediate benefit, so long as some underlying focus of infection is allowed to persist. But in co-operation with the remedial measures, it exerts a definite curative influence on miners' nystagmus. The author reports six such cases treated by ultraviolet irradiation. — *J. A. M. A.* (August 13) 1932.

On X-Ray Therapy in Pædiatrics. Prof. W. Birk, University Children's Clinic at Tübingen.

Münchener medizinische Wochenschrift, No. 28/29, 1931.

There are certain indications in which x-ray therapy does more good than any other kind of therapy. In the case of early tb. of the glands of the peritoneum or mesentery, x-ray therapy is the method of choice. It is effectively supported by rest cures in the open air, natural and artificial heliotherapy (quartz light irradiation), cod liver oil and a mixed tasty diet. In the case of exudative tb. of the peritoneum, it is true that even after punctures or quite spontaneously, a cure is effectuated. But often after resorption of the effusion, adhesive nodulous transformations occurred, as for instance an ileocoecal tumor was formed, or else mesenterial tb. arose, or perforation through the navel took place, or a faecal fistula, and the child slowly perished from exhaustion. Since the application of x-ray, even in cases which do not appear serious, no unfavorable course has been noted. It is true that adhesions may also occur after x-ray therapy, but they never become dangerous and there never is any faecal fistula. Nor has any child perished since the x-ray era (ten years) at the clinic in consequence of the adhesive or nodulous form.

Tb. of the glands of the mesentery has always been considered to be the prognostically most unfavorable form of tb. of the peritoneum (wasting away to a mere skeleton »Tabes mesaraica«). In 50 per cent of the instances, this disease occurs together with other tb. foci in the body, a fact that should be taken into consideration when the indications of x-ray treatment is given. The latter exists: 1. in cases of isolated tb. of the mesenterial glands; 2. with simultaneous peritoneal tb. of the intestines, the joints, the glands, the skin, the bone, the bronchial glands or the pleura; 3. also with simultaneous unilateral tb. of the lungs, insofar as the latter is controlled by a pneumothorax. Of all these cases

the greater part can nowadays be cured, though it takes twice as long as the other forms of abdominal tb. With the other section there are always relapses (diarrhoea, colic, etc.) even after many years. But if one controls the children permanently and, if necessary, irradiates them again, even these latter cases are ultimately cured. The great difference is: In the previous era, x-ray treatment cures were the exception. Today a failure is the exception.

Tb. of the lungs. In the tertiary stage x-ray gives no hope of success because the child lacks the prerequisites for x-ray treatment (slow progress, inclining to latency, productive form). In the secondary stages, x-ray therapy is advisable, but only for the extrathoracal foci. We would warn, in particular, of the irradiation of perifocal infiltrations. Even for tb. of the bronchial glands at the root of the lung, x-ray therapy should be rejected, as tb. of the hilus inclines more than any other form of tb. to spontaneous healing, and because x-ray treatment might lead to the breaking down or acute swelling of the glands (cough, shortness of breath, fever, etc.).

X-ray therapy of the outer gland tb., in particular of the lymphomata colli tb. is indicated as soon as leukaemia and lymphogranuloma are excluded and tb. has been ascertained (Pirquet, etc.). Glands that have already broken down should first be punctured; in case of softened glands the parents should be told that x-ray treatment will probably accelerate the process of breaking down. Fistulae should also be irradiated. Tb. of the glands can be cured by x-ray treatment and moreover twice as promptly as formerly.

Leukaemia with children often occurs in the form of a haemorrhagic diathesis and usually (in contrast to adults) takes an active course, sometimes taking only a few days, before any swelling of the spleen or glands occurs. X-ray treatment is powerless in face of this disease. Only in the rare subacute and chronic cases and in presence of a good general condition is a cautious attempt with x-rays indicated. — If there is lymphogranuloma, x-ray treatment, as with chronic leukaemia, can only prolong life for several years, but cannot cure. But the temporary effect is eminently successful. The swelling of the glands of the neck, in the axilla, on the hilus, etc., disappears promptly, yet permanent cure ranges among the rarest instances. Symptomatically, x-ray treatment is the only aid against the conditions of nervous fear and dyspnoea, due to the pressure on the glands of the throat and hilus. In cases of purpura, particularly with the typical cases of haemophilia, even if every other remedy fails, x-ray irradiation of the spleen can act as a styptic. Only with symptomatic purpura (haemorrhage with leukaemia, sepsis, etc.) and in cases of thrombasthenia (haemorrhage of the female sex), x-ray, as a rule, fails to relieve. Also with vaso- and myelogenous purpura, success is uncertain. Irradiations of the bone marrow with large or small doses are ineffective.

In case of asthma bronchiale and pneumonia, x-ray treatment will scarcely give relief. No definite and final judgment has as yet been rendered concerning x-ray treatment of chronic tonsillitis and adenoids. In case of hyperplasia of the thymus, which leads to trachea compression, x-ray treatment is indicated. With struma of newborn infants, inunctions with an iodine salve are usually successful and x-ray treatment need not be resorted to. With pylorospasm of infants, an operation should be undertaken. Attempts with x-ray in three of five cases had no success. If, however, after a vain attempt with x-rays, one has to operate, the chances of success are much reduced. — In cases of hydrocephalus of children (hydrocephalus occlusivus, interruption of the flow of brain liquor from the ventricles to the spinal canal), repeated ventricle punctures must be made or else one makes the corpus callosum puncture. According to *Sgalitzer,* only x-ray treatment can stop the secretion of the plexus choriodei. In the few cases hitherto treated by x-ray irradiation results were partly positive and partly negative. With poliomyelitis, the success of x-ray irradiation in early cases is doubtful, because paralysis receded even without it. — The x-ray success obtained by *Wieser* for mentally backward children or feebleminded children and in cases of psychosis, etc., are subject to sceptical opinions. With furunculae, phlegmones, etc., small x-ray doses are successful. — (*Ars Medici,* March, 1932.)

Paraphimosis — Red Light. Dr. K. Boas, Crimmitschau.

Medizinische Klinik, No. 42, 1931.

The usual procedure is antiplogistic and consists in the attempt at a non-haemorrhagic reposition: the constricting collar is drawn forward over the sulcus coronarius with the index and middle fingers of both hands, and at the same time the glans is pushed back by both thumbs. According to *Löhe,* the reposition can be facilitated if the contricting ring is first punctured in many places with a thick canule. Sometimes, it is impossible to avoid an incision of the constricting ring.

Now, however, the author reports that the swelling rapidly recedes after a red light irradiation of from 10 to 15 minutes. He uses the small Sollux lamp with the red filter or (perhaps even more effective) the Goldscheider-Minin red bulb on a stand that can be adjusted in any plane. He has been using this simple, non-haemorrhagic method for years, always with complete success — cure in two to three weeks — and regards it as the method of choice.

The Removal of Warts and Pointed Condylomas. From a questionnaire of the Dermatologische Wochenschrift. Prof. C. Bruhns, Prof. L. Kumer, Prof. J. H. Rille Dr. E. Zurhelle.

Derm. Wschr., **49,** 1931.

For isolated hard warts, electrocoagulation can be used, but it requires local anaesthesia, and leaves behind scars. Carbon dioxide snow (freezing for half to one minute) is less painful, but also produces scars. Electrolysis, with repeated insertion of the double needle, causes less distinct scars and less pain. Large single warts can be removed by mesothorium or radium. For very numerous and hard warts, the best method still is, freezing and removal

with the knife, or curetting. Treatment by suggestion is sometimes successful. — Soft warts (verrucae planae juveniles) are best treated with x-rays or with Bucky's border rays. An improvement of this method can be had if salicylic acid plaster is applied beforehand to loosen up the tissue. Electrocoagulation, with a weaker current than in the case of hard warts, is also effective here; as is well known after the removal of a few warts by this method, all the others sometimes also disappear. — Senile seborrhoic warts (particularly on the face) are treated with radium, excision, electrolysis, or electrocoagulation with the diathermy loop. — For small pointed condylomas, it suffices to apply resorcinum pulverisatum, which because of its painfulness, should be used alternately with an indifferent salve, possibly in two-day cycles. Large papilloma areas, however, should be removed under narcosis (local anaesthesia in these cases is always bound up with the danger of wound infection) with the knife followed by Paquelinization, or with the diathermy loop.

Treatment by suggestion is often effective as is also *Biberstein's* immunity therapy, although the extract used requires a rather complicated preparation and the treatment takes a long time. In the use of ray therapy (Roentgen, Bucky, radium) the experience is always encountered that only a certain kind of ray is effective in individual cases, that, for example, warts which do not react to hard radium rays can be removed by soft rays. Peri- and subungual warts and those on the foot-sole react best to radium, warts of the hairy scalp to electrocoagulation followed by treatment with border rays, seborrhoic warts to freezing with carbon dioxide snow, excochleation, or cold caustic. In cases of pointed condylomas, the old methods of excochleation or of drying with Pulvis frondum sabinae, Talcum venetum ana partes aequales are still the most valuable. Cold caustic has the advantage of slight bleeding but requires a good local anaesthesia and even general narcosis in the case of large condylomas. The ray therapy should remain the ultima ratio in such cases because of the nearness of the genitals.

Nowadays, pointed condylomas are best removed with diathermic electrocoagulation, which is clean and blood-sparing. If the necessary apparatus is not available, the old method of curettage is very effective. This method (in contrast to knife and shears) removes only the diseased tissue and causes smooth superficial lesions over which new skin rapidly grows on the application of antiseptic dusting-powder (Dermatol, etc.). The bleeding can be quite considerable in the case of voluminous papillomas on the female genitals but is naturally not dangerous. It is advisable to begin with the lowest growths so as not to be disturbed by blood trickling down, and to cover the operated spots immediately with dry cotton (damp cotton is ineffective in stopping bleeding). The skin should be tensed to facilitate the excochleation. Narcosis is almost always unnecessary, local anaesthesia is sufficient. Sensitive persons, however, should be given a preparatory corrosive treatment with strong Resorcin paste: Rp. Resorcini, Amyli ana partes aequales. This is applied in thick layers not only on the surface of the growth but also particularly in the clefts between them; the healthy skin can be protected by pads of cotton. The corrosive treatment lasts two to six days according to the circumference of the condylomas, and often suffices alone for their removal; they become dry, dirty-grey, and either fall off spontaneously or can be easily scratched off. To prevent relapses, the excochleated spots can then be smeared with arg. nitr. or chloride of iron. The fig-warts can naturally also be removed by other corrosive agents (trichlor-acetic acid, fuming nitric acid, etc.), but Resorcin paste is painless and most efficient. Summitates Sabinae, an old and well-tried remedy, works well in some cases, particularly for condylomas localized in the preputial sac and in the sulcus coronarius.

In cases where there are large numbers of verrucae vulgares, the use of the usual methods of cold caustic and electrocoagulation is rendered difficult because of the necessary anaesthetization. For such cases, it is better to use high-frequency sparks or to dab the warts with Acid. carbol. liquefactum, which produces a certain anaesthesia. The wart can then be removed layer by layer starting from the top with the bent shears till a slight bleeding sets in which can be stopped with chloride of iron solution. Six to seven such treatments in half week intervals usually bring about the cure, even in the neighborhood of the nails, without disturbing the ability of the patient to attend to his occupation. Radium is the method of choice for warts on the planta pedis. In treating verrucae planae juveniles, an attempt should first be made with a salve containing 5 per cent salicylic acid and 10 per cent Resorcin, possibly resorting later to pills containing Hydrarg. iodat. flavum, or arsenic, or x-ray treatment. Senile warts can be removed with carbon dioxide snow and, if their thorough removal is indicated for cosmetic reasons or because of the danger of carcinoma, after softening of the crusts, with cold caustic or electrocoagulation, possibly with radium after-treatment. Papillomas which do not disappear on treatment with x-rays can be removed by the surgical method, — after-treatment with Summitates Sabinae and Alumin. ust. ana partes aequales. It is necessary to check up every month or two on cases with infiltrating growth for possible relapses or development of a carcinoma. — *Ars Medici* (May) 1932.

Effect of Radium Emanation on Histocyte in Liver of White Rat. G. M. Higgins and J. T. Rogers.

Am. Jour. Path., **8**:335 (May) 1932.

Higgins and Rogers report the results of a study of the reaction of the histocytes in the liver to radon, as contained in gold radon seeds. Similar but inactive gold seeds were used in a series of control animals to determine the local reaction to such foreign bodies. All local histocytes within the vicinity of the inactive gold seed responded immediately to the foreign body by retracting their processes, desquamating into the sinusoids or migrating into adjacent parenchyma. Their function as littoral histocytes had apparently ceased and they were not concerned in an attack on the foreign body. Seventy-two hours after insertion of the inactive seed

into the parenchyma, an effective barrier had been formed around it by these actively migrating histocytes. Subsequently these cells contributed toward the formation of connective tissue. All histocytes in the vicinity of the active radon seed were as susceptible to the emanation as the cells of the parenchyma. The extent of the destruction by the radon increased until the maximal injury was reached about the thirty-fifth day. Histocytes within the zone of injury were destroyed, and those immediately beyond did not manifest signs of restorative activity during this period. After the fifth week, however, a retarded restorative activity was manifested by the histocytes just peripheral to the zone of maximal injury. By the tenth or twelfth week these cells considerably remote from the radon seed, and which either had not been affected or only slightly affected by the radon, migrated rapidly toward the seed and contributed toward the formation of a wall comparable to that seen three days after the implantation of the control seed. — *Jour. A. M. A.* (Aug. 13) 1932.

Keloids and Their Treatment. Dr. U. Saalfeld, Berlin.

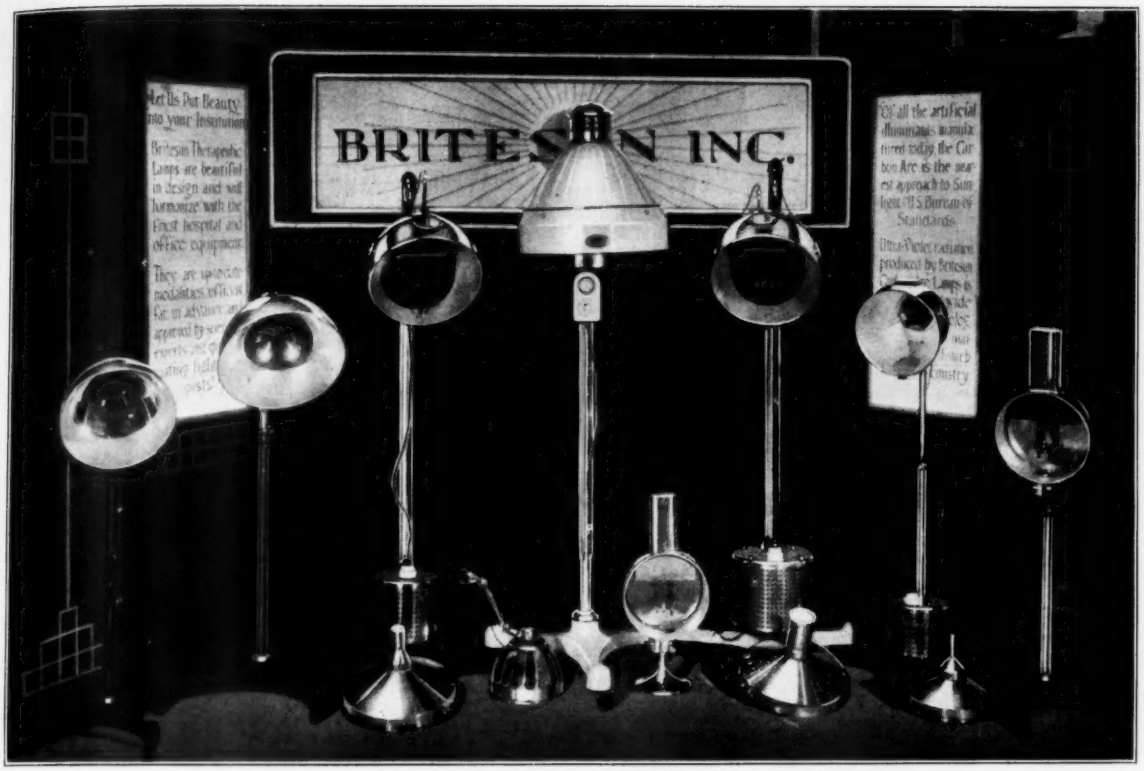
Therapie der Gegenwart, **9**, 1931.

We can differentiate between spontaneous keloids, scar keloids and hypertrophic scars which are closely related to the aforementioned. The skin covering the keloid is generally colored from red to dark red, less often bright red to tendon-like shiny white. The spontaneous keloids are in most cases 2 to 4 cm long and ½ to 2 cm. wide; in 50 per cent of the cases they are localized in the sternal region. The excision of a keloid without subsequent x-ray treatment is purposeless, for we find a recurrence within a few weeks. Successful results with a modified Thiersch transplantation have been reported by *Gohrbandt* (Med. Welt, 1930), in which not only epidermis layers are grafted on, but also the incision for the flap is made so deep that it lies within the stratum papillare. It is also a mistake to use galvano- or cold caustic and carbonic acid ice treatment without accompanying x-ray treatment. Quartz light can produce a new keloid through the skin irritation. Other forms of light should also be avoided. For x-ray treatment the hard filtered rays are most effective, whereby the much more sensitive surrounding skin area should be thoroughly protected (covered). The chosen treatment for keloids, which are not too large, is radium. In most cases, 10 mg. per hours area suffice (the surrounding area should be carefully covered with lead plates, the radium capsule laid either directly on the area or fixed at a distance of 1 to 2 mm. with the plate). The author employs a preparation with a 0.1 mm. silver filter; other authors prefer stronger filters. Extensive keloids are treated with x-ray irradiation. Dosage somewhat below that for erythema; for children ½ to ⅓ dosage. The Roentgen or radium irradiation is repeated once or twice in periods of 3 to 6 weeks (according to the dosage and hardness of the rays) with the same dosage or perhaps a weaker one — depending on the extent of the reaction. Fresh and soft keloids should be treated with soft rays. The keloid does not disappear entirely; it becomes softer, flat and pale. Irradiation suffices in cases of smaller and flat keloids; larger ones must first be either excised with the knife or high frequency current; irradiation must follow at least three days after removal. In cases of extensive keloids either the *Gohrbrandt* plastic comes into consideration or the keloid is irradiated, then excised from 4 to 6 weeks later, followed by a new series of irradiations. Any possible sutures situated outside of the scar itself should also be irradiated. — The pepsin-boric acid method of *P. G. Unna* (damp poultices with pepsin 3, icd. boric 6, Aqu. dest. ad 300 or application of pepsin-boric acid. guttaplast Beiersdorf No. 244) brings about a softening and reduction of the keloids through lengthy and consecutive application. It is particularly efficacious for after treatment and for hypertrophic scars. — *Ars. Medici*, (May) 1932.

New Physical Therapy of Circulatory Disturbances. E. Eisenmenger.

Wien. Klin. Wochschr., **45**:591 (May 6) 1932.

In the introduction, Eisenmenger discusses the motive powers of the circulation; namely, the cardiac pressure, the activity of the capillaries, the intrathoracic negative pressure and the intra-abdominal positive pressure. He then relates that he was able to influence circulatory disorders by producing supra-abdominal air pressure fluctuations. He employs a suction and pressure air pump that acts by way of the flexible abdominal walls and the soft abdominal organs on the diaphragm and through this on the lungs and heart. He illustrates the efficacy of this treatment by five case reports. The treatment is employed for from five to fifteen minutes at a time. During the first two or three minutes the pressure changes are made more rapidly, namely, from twenty to twenty-two times, but then the frequency is reduced to from twelve to sixteen times. Then intensity of the pressure, however, is at first weak and later stronger. In the last part of the article the author discusses the influence of the pressure changes on the venous system, the two auricles, the pulmonary circulation, the aorta, the splanchnic region, the liver and the other thoracic and abdominal organs. — *J. A. M. A.*, (August 6) 1932.



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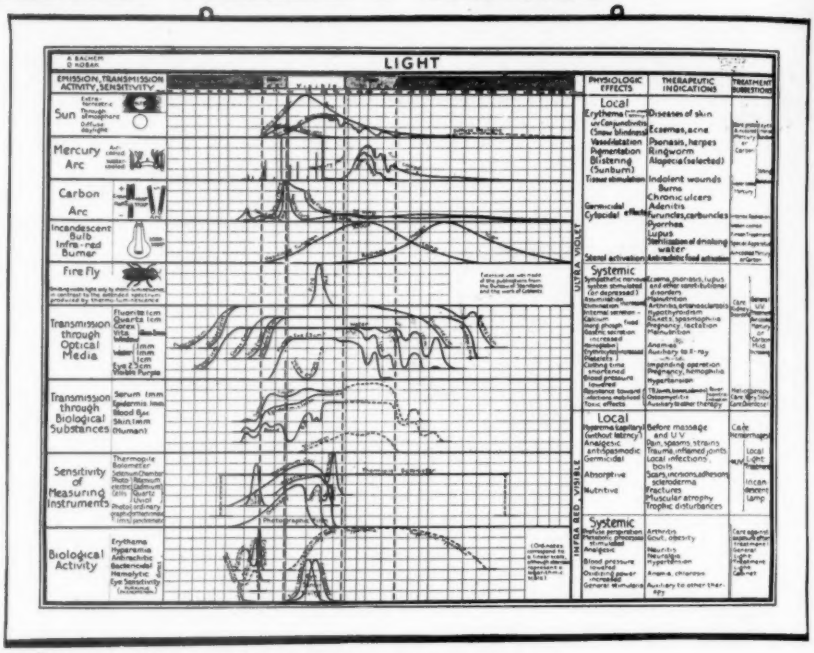

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